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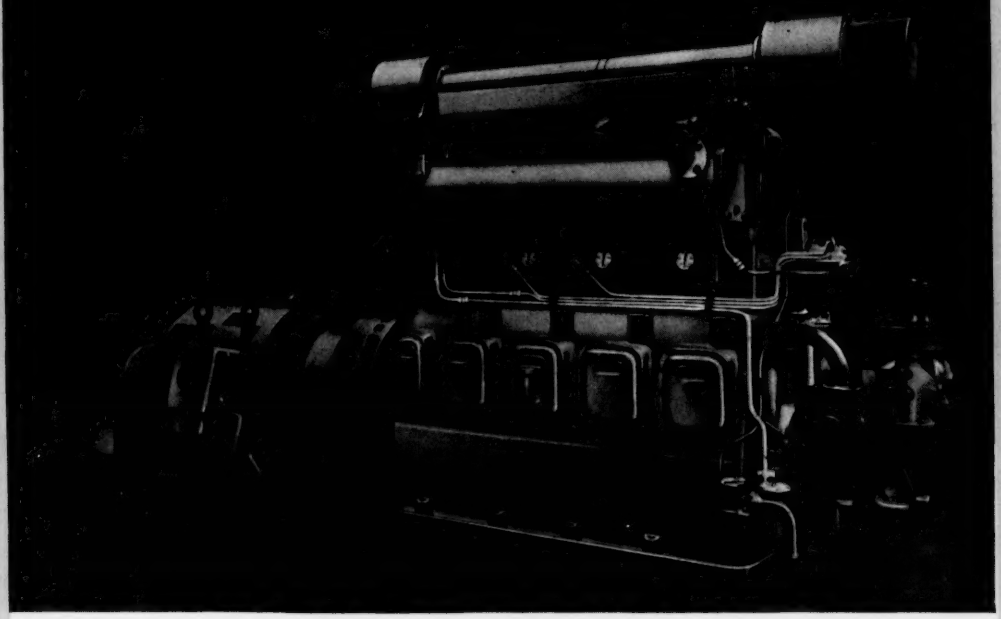

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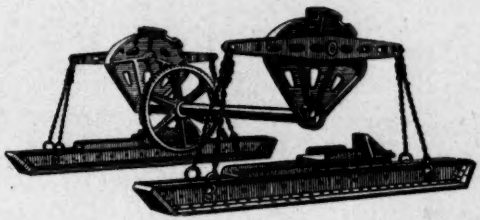

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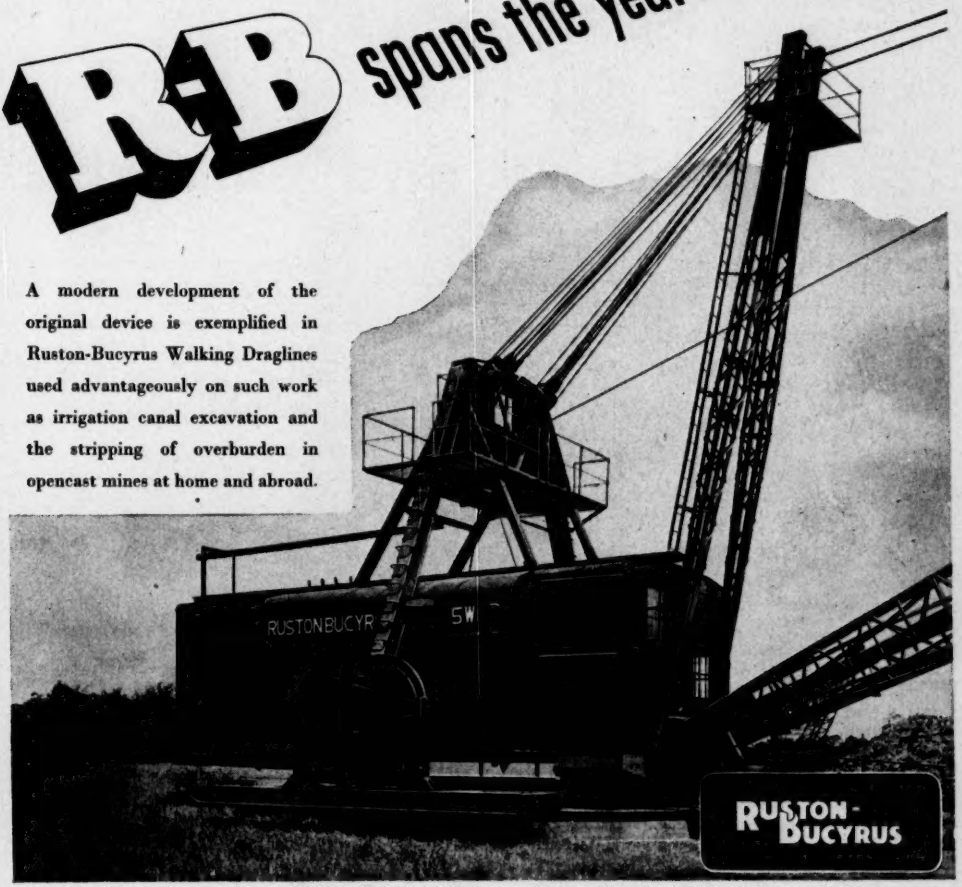

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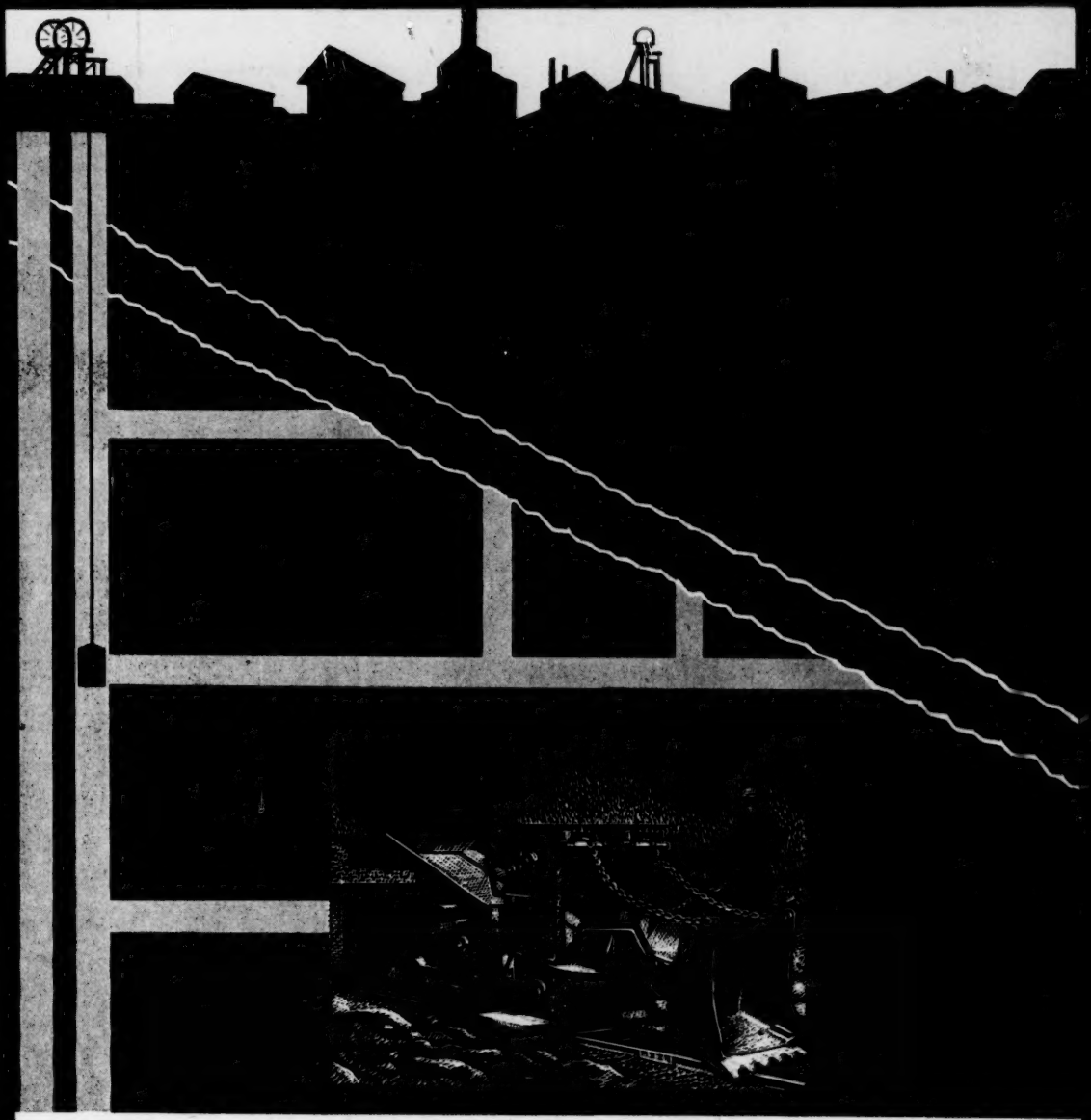

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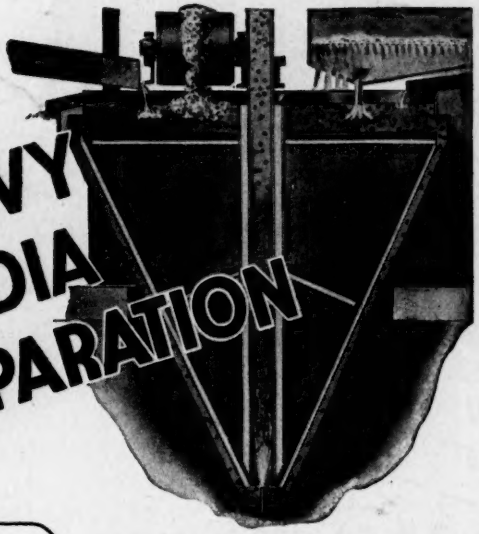

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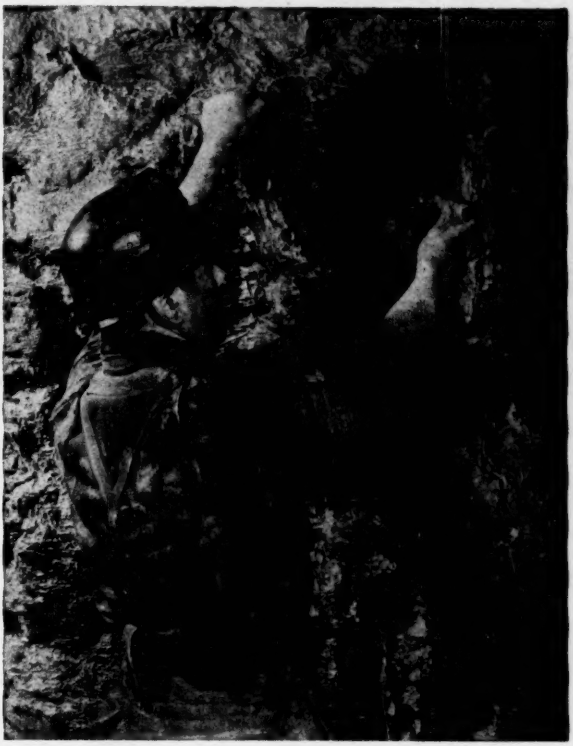

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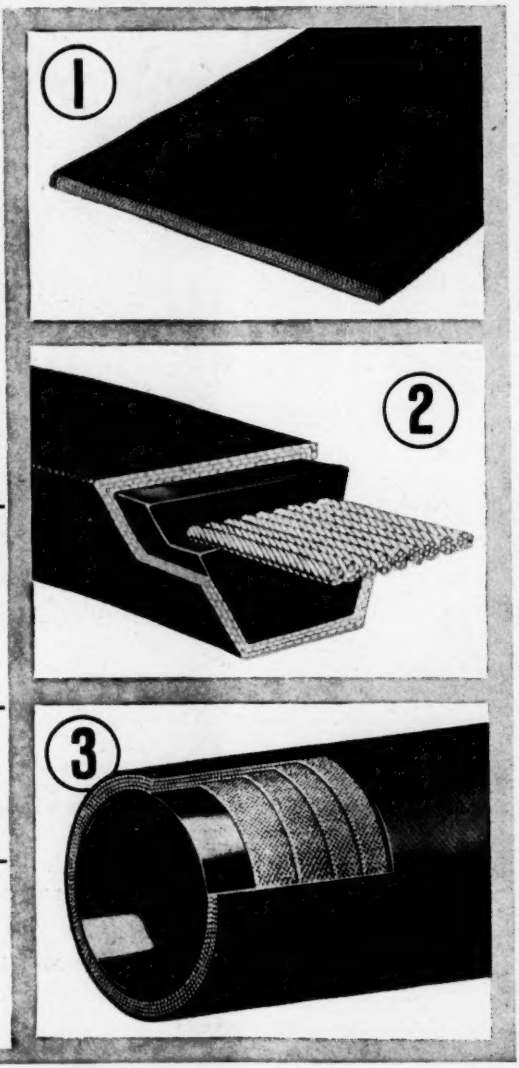

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NOTES AND COMMENTS

Future of the Australian Gold Mining Industry

The future of gold and base metal mining in Australia cannot be regarded with any great measure of optimism, writes our Australian correspondent.

Major mineral discovery ceased with the finding of Mount Isa in 1922. In the past six years powerful organizations, such as Zinc Corporation, North Broken Hill, Broken Hill South, Western Mining Corporation, Mount Isa Mines, and Gold Mines of Australia have carried out intensive and widespread geological and geophysical surveys, amplified by large-scale diamond drilling. The result of this effort is disturbing, for no new discovery of any importance has resulted, with the possible exception of the Sugarloaf orebody at Mount Morgan, which is stated to have been known for some time previously, but not prospected. The big copper lode at Mount Isa was located prior to 1939 and its development was commenced to meet the wartime demand for copper. There is, therefore, little or nothing to show, in the way of new discoveries, for the vast amount of highly organized and efficiently conducted effort.

There are, however, still wide, unexplored areas in metalliferous zones, covered by alluvium, sand, cement, or basalt, which may contain mineral deposits, but an intensive search in these areas calls for highly developed scientific and technical equipment and direction. It is beyond the sphere of the old prospector, who is practically extinct, though there may still be a few localities where the methods of this admirable old-time class of men might have some hope of success. Search by modern technique for extensions of abandoned orebodies, for repetitions of such occurrences, or of structures likely to be metalliferous have met with little better success than has attended the prospecting for new ore deposits.

Western Mining Corporation is re-opening some old, abandoned gold mines, Gold Mines of Australia is successfully working goldbearing alluvial deposits, which were previously uneconomic, but the great majority of old, abandoned mines have, after re-examination, relapsed into former idleness. The objective of the big prospecting organizations was the location of ore deposits capable of relatively large output, and their abandonment of an old mine does not necessarily preclude the possibility of its successful exploitation on a small scale by a company of moderate capital. It is, therefore, to the small mine that Australia must look for future increase in mineral production. The famous mines, such as those of Broken Hill, Kalgoorlie, Mount Lyell, Mount Morgan, Mount Isa and others, have long lives ahead, but they are being developed nearly to capacity. The shortage of copper and tin in Australia is acute, and lead and zinc are rapidly approaching the same supply position. That the position must be met by the small mines is being appreciated, and some attention is being directed to them, with the viewpoint of group working and delivery of ore to central treatment plants within reasonable radius for transport. The numerous small lead, zinc, copper and tin deposits in New South Wales and Queensland which, in the past, have been worked in the oxidized zone and then abandoned, offer the chance for the realization in some degree, of this objective.

There seems, however, little constructive Government realization of the seriousness of the metal position, and investment of private money by way of the small or moderately capitalized company is effectively strangled by taxation, regardless of industrial handicaps. As instances of taxation, one-third only, of capital put into base metal mining as calls, is allowed as exemption from income tax, and one-third only of dividends received from metal mining companies is tax-free; the fact that in many cases such dividends are not income but essentially a return of capital is ignored.

Raising of capital, in excess of £10,000 for new enterprises, or for expansion, must be approved by the Capital Issues Board; yet despite the acute metal position, applications for capital for sound undertakings have been refused, or the amount considered necessary by men competent to know the needs of the case have been drastically reduced, so that it may be useless to proceed with the enterprise. Unless there is practical awareness by the Government of the acute position of metal supply, and proper encouragement given, the position of the secondary industries clamouring for their needed metals, and of the communities depending upon them, will become more than serious.

The fallacy, fostered by politicians and journalists, of huge undeveloped natural resources in Australia, has not as yet been realized.

World's Largest Aluminium Plant for British Columbia

One of the most important projects in the post-war industrial expansion of British Columbia, Canada's Pacific coast province, is the construction of the giant aluminium manufacturing plant now being built by the Aluminum Co. of Canada, which will raise the Dominion to the front rank of the world's aluminium producers.

The plant, which will be sited near the old Indian village of Kitimat, is expected to be completed during 1954, when the first ingots are planned to come off the production line. Initially, it is estimated that some 330,000,000 lb. a year will be produced, although by 1960 when plant capacity is reached, output is expected to be in the neighbourhood of 1,100,000,000 lb. a year.

This project is closely connected with Alcan's programme now under way in Jamaica, where original plans for the construction of an alumina plant have been revised to include new plant extensions which will raise the Jamaican plant's capacity from 200 s.tons to 500 s.tons alumina per day. This extension to the existing plant is required to provide more raw material for the Canadian aluminum industry, and to feed Alcan's Kitimat smelter when it comes into production. The first production of Jamaican alumina is scheduled to start some time in the closing months of the current year.

Incidentally, the Aluminum Company of Canada was the first aluminum company to purchase Jamaican bauxite properties and also pioneered in the geological exploration for the ore throughout the island.

Ungava Iron Ore Deposits Assume Strategic Importance

The rich Ungava iron ore deposits in Northern Quebec with which U.S. companies are closely connected may become the only outside source of steel for the United States should a third world war occur, declared Mr. J. A. Retty, consultant geologist for the Labrador Mining and Exploration Co., at a recent meeting of the Montreal Chamber of Commerce. At present, he said, the United States was consuming more than 100,000,000 tons of iron ore a year, and that in the event of a third world war, foreign sources of ore and scrap would be cut off.

Touching on the controversial question of whether Canada herself could fully develop and exploit her steel resources, Dr. Retty stated that there was practically no Canadian market for the iron ore. This contention would seem to be borne out by the recent entry of British Columbia into the lists of world's steel suppliers, with the shipment of more than 100,000 tons of ore to Japan from its low grade Quinsam Lake deposits on Vancouver Island. This operation is being undertaken by the Argonaut Co., a subsidiary of the Utah Construction Co., and is based on the concentration of low grade magnetite ore.

Possibility of Steel Factory for S.W. Africa

A steel factory several times the size of Iscor may be erected in the desolate Kaokoveld in northern South West Africa, states a Press report from Cape Town. The undertaking behind this project is the American Bethlehem Steel Corporation, the world's largest steel manufacturers and ship-builders.

The company is stated to have acquired prospecting concessions and a group of selected geologists and other scientists are actively engaged in investigating deposits. Dr. Edwin T. Hodges, the Company's representative in Africa, arrived a few months ago. The factory, it is reported, might have its own harbour where three ships could be loaded each week, a modern town would be built and the labour force would consist mainly of South Africans.

Belgian Congo Mining Exports

(From Our Own Correspondent)

Brussels, February 4

The statistical service of the Belgian Congo has just published the 1951 exports statistics for the Belgian Congo and Ruanda-Urundi, from which the following figures relating to mineral exports have been extracted:

	Net Weight	*Customs' Value in C.Fcs.*
Cadmium	24 tonnes 854 kg.	10,843,605
Cobalt		
granules (94%)	2,605 ,, 920 ,,	531,278,191
copper-cobalt alloy	7,102 ,, 850 ,,	462,793,170
Copper	183,929 ,, 911 ,,	4,749,865,976
Diamonds		
from the Kasai (the majority of which were jewellery stones)	617,216 ct.	125,156,197
from the Lubilash (the majority of which were dustrial ones)	9,714,159 ,,	456,612,424
Gold	11,375 kg. 094 gr.	765,559,868
Manganese ore	65,723 tonnes 165 kg.	70,538,506
Silver (exclusive of the ore recovered in Belgium)	1,015 kg. 510 gr.	1,393,756
Spodumene	5 tonnes 200 kg.	8,034
Tantalum-Niobium ores	210 ,, 989 ,,	13,799,661
Tantalite ores	23 ,, 791 ,,	1,483,361
Tantaliferous slags	6,883 ,, 852 ,,	44,115,970
Tin ores	13,717 ,, 826 ,,	1,406,190,314
Tin metal	2,712 ,, 984 ,,	387,098,821
Tungsten ore	471 ,, 079 ,,	90,692,895
Zinc ore		
crude conc.	116,925 ,, 503 ,,	445,183,928
roasted conc.	51,708 ,, 770 ,,	201,160,050
Zinc	443 ,,	4,770
Other mineral products	1,136 ,, 425 ,,	5,299,681

It is difficult to indicate the destination of these exports because a large part was forwarded by the producers to depots either at Lobito or at Beira, pending a decision on their final destination. Naturally enough, it appears that no shipments were made to the U.S.S.R., or to her satellites. As to uranium, no figures have been released for security reasons.

It is of interest to note also that the customs value of the mining products exported last year from the Belgian Congo and from Ruanda-Urundi amounts to 9,769,079,179 C.Fcs.; and that the value of all other products together amounts to 10,107,786,957 C.Fcs., thus, mining products form the main export group, with copper as the leading item.

TRANSPORT CRISIS

The export results for 1951 might have been better had the Congo not suffered towards the end of the year from an acute transport crisis. This crisis was a consequence of the fear of war, which provoked a greater demand for Congo products and, above all, for mining products. Further, this fear of war induced Congo companies to place large orders overseas, and also to produce more in order not to be devoid of requirements should war break out. Consequently, transport firms were unable to face the sudden and marked increase of both imports and exports. However, they have now placed orders to enable them to meet an annual increase of traffic exceeding the former normal increase of 10 per cent.

South Africa

(From Our Own Correspondent)

Johannesburg, February 5

The rather gloomy analysis of the prospects of the new Free State mines recently published in *The Financial Times* has not received any great measure of support in this country, particularly in technical circles. While admitting that quite a number of unforeseen snags have occurred, the general opinion is that these difficulties will be ironed out and that the eventual output of gold may well turn out to be greater than the original estimates, based on drilling, suggested.

Up to the present, St. Helena has proved a disappointment to the markets. But it was welcome news that it returned a profit in January which is satisfactory after only three months operations. It should be borne in mind, however, that from a relatively early stage in St. Helena's development it was known that a considerable portion of the area was badly faulted, but it is believed that an improvement will take place as development proceeds further away from the sub-outcrop.

Welkom's quarterly report made encouraging reading. Apart from the high rate of advance—22,421 ft.—and the further improvement in values on the Basal reef horizon, there was the interesting exposure reported of a highly payable stretch of ground on the "B" reef. Furthermore, the Alma borehole, yielding 1,221 in.-dwt. at a relatively shallow depth of around 1,300 ft., suggested that a greater area of the property might carry the reef at shallower depths than was originally estimated.

In terms of the whole area underlain by the Basal reef, the amount exposed so far is negligible and it is, therefore, not possible to form anything like accurate assessment at the present stage of development. There are, nevertheless, a number of points worthy of consideration.

ASSESSMENT OF THE BASAL REEF

The first of these is the opinion that the new fields consist of an extensive series of pay-shoots, which make them comparable with the Far East Rand rather than with the Central Rand with its low but continuous values. Within the shoots, however, the average gold content would appear to be relatively constant in that the in.-dwt. figure does not show great variations. Additionally, the enrichment of the reef is considerable. This contention is based on the high values yielded from a relatively large proportion of the total number of boreholes put down during the extensive drilling programme which preceded the opening up of the new mines. However, these borehole results must be regarded as a large number of samples taken at random and as such may, or may not, be indicative of the richness of the whole area. In this connection, the case of Sub Nigel is worth recalling. This company operates on a pay-shoot system and the initial drilling programme failed to intersect any payable values. At Blyvoor, too, initial drilling results gave no indication of the remarkable richness of this property.

Another important consideration is the likelihood of development values proving to be in excess of the borehole figures. It has been shown in the Far West Rand, both by experience and by controlled experiments at Blyvoor, that drilling values are reduced by grinding. The Basal reef in the Free State and in the Klerksdorp area, where it is called the Vaal reef, has a high carbon content, and indications are that here too borehole values will be less than actual development results. At Welkom, on the relatively limited amount of development work accomplished, the average value of payable disclosures is well in excess of all the boreholes—except one—put down in this particular area.

RISING COSTS ABSORB PREMIUM REVENUE

With the publication of the Chamber of Mines' year-end figures it is now possible to complete the picture of the impact of rising working costs on the gold mining industry. Over the year, costs rose by 2s. 2d. to 31s. 9d. per ton milled or by 11s. 10d. to 169s. 1d. per f.oz., equivalent in round figures to an increase in working expenditure of approximately £5,000,000 to nearly £93,000,000.

This increase swallowed up the additional revenue received from premium gold sales and aggregate working profits of the mines showed a net decline of approximately £2,800,000 compared with 1950 when the figure (excluding clean-up operations on some of the old mines) was £50,850,000.

Average costs in December showed an increase of 6d. a ton compared with November and stood at the record level of 33s. 3d. Although December is always an abnormal month indications are that current costs are only fractionally below this level—if at all.

The other sections of the mining industry have not as yet been affected by rising costs since the margins of profits are so large at current world commodity prices that they are not an important consideration. Furthermore, they are in the fortunate position that, in spite of "controlled" prices for many of them some elasticity exists which has so far been denied the gold mines.

BUOYANCY OF UNION'S BASE METAL INDUSTRY

The buoyancy of the Union's base mineral industry is reflected in the figures for the first 11 months of last year recently issued by the Government. The only two which show declines compared with 1950 are coal and manganese, where the shortage of railway transport has curtailed sales, in spite of increased orders and higher prices.

Copper production amounted to 32,295 tons, valued at £6,600,000, which was £1,000,000 more than the total for the whole of 1950 and £3,000,000 greater than the 1949 total. Further expansion is likely to be expected with Messina's decision to go ahead with opening up its Artonvilla area about four miles east of its present property. In addition, Northern Coppers, which also has been conducting exploratory work in the Messina district for many years, has now placed orders for a small reduction plant with a capacity of 3-5,000 tons a month producing 60-100 tons of copper a month on the basis of a 2 per cent Cu. ore content.

Tin producers have also had a very good year, producing 723 tons during the 11 months, valued at £759,000. The total for the year should top the £800,000 mark, which will be more than double the 1950 figure.

Interest in asbestos remains at a high level and most of the producers are engaged in increasing their capacities. One of the most interesting developments is the discovery of a deposit of a very high-grade spinning fibre—reported to be about 15 in. in length—near Gaberones in British Bechuanaland.

Current output has been bought at a very high price and the deposit is said to be of considerable size. The Msauli property, which adjoins the Havelock Mine on the Transvaal side of the border has been doing well. A second quarry is being opened up and a drilling programme has been embarked upon to explore the possibility of an extension of the known deposits.

The Cyclone as a Separator Tool in Mineral Dressing

By K. A. FERN, B.Sc., A.M.I.M.M.

The following article is an extract of the paper presented by the author, who is the chief metallurgist of Cyanamid Products Ltd., before the Institution of Chemical Engineers, in London, on Tuesday of this week. The article discusses the development of cyclones using heavy suspensions for mineral separation, sets out the variables which have been investigated under operating conditions and discusses the effect of these variables on separations. Results are given of tests carried out with cyclones of 3 in. and 6 in. diameter on a variety of minerals, and brief reference is made to the cost of cyclone separator plants.

The first published reference to the use of cyclones for separating minerals suspended in water was made by the late M. G. Driessen, at one of the Dutch State Mines coal-washing plants. This plant included a washer using a loess suspension in water as the separating medium, and cyclones were developed to thicken the dilute suspension washed from the coal, so that it could be returned to the separating vessel. In the operation of these cyclones, it was noticed that the fine coal in the "washings" was also present in the cyclone overflow. These observations were followed up in further research work, but the war of 1939-45 interfered both with the work and with the publication of results.

However, in 1945 Driessen read a paper before the Institute of Fuel[1] in which he discussed the behaviour of bodies falling in a viscous liquid or fluid, described the development of the cyclone as a thickener and separator for fine coal. In a later paper which he presented to the American Institute of Mining and Metallurgical Engineers, he went more deeply into the mathematics of separation in a cyclone.[2] This was followed in February, 1947, by a further paper by Geer and Yancey,[3] who described work done on an experimental cyclone unit at the U.S. Bureau of Mines.

So far, the work done in the field of mineral separation had been limited to the cleaning of coal, but during 1947 an experimental unit was set up in the Stamford (U.S.) Research Laboratories of the American Cyanamid Company, and this unit during the last four years has been used to test a wide range of minerals, as well as to study the fundamentals of the separation. As a result of this work, and that done in the laboratories of the Dutch State Mines, it has been possible to formulate certain principles of operation and to indicate the variables which affect the separation. It has been found that once the optimum operating factors have been selected for any one specific problem, the cyclone separator will not normally require any further adjustments to meet changes in the rate or type of feed, other than to maintain the proper specific gravity of the suspension in use.

The following discussion indicates the general effect of changing one variable, while the other variables are being held constant.

The principal variables which have been investigated are as follows:

DIAMETER OF CYCLONE

The size of the Cyclone determines, in part, the size of the material that can be separated. The 3-in. Cyclone is limited to a 10 mesh top size, whereas the 6-in. Cyclone can treat material as large as ¼ in. Fourteen-inch Cyclones in Holland have treated feed up to 0.32 in.

Included angle of conical section of Cyclone.

This depends mainly on the gravity of separation desired, the fineness of medium used and the specified gravity of the dry medium. Although a Cyclone having 20 deg. apex angle conical section is more efficient as a separator than one with a 60 deg. apex angle conical section, the latter is necessary in many cases. With a given medium more latitude as to separation gravity is possible with the 60 deg. section. This is particularly true when it is desired to effect a low gravity separation with a comparatively coarse medium, or where a separation is desired that approaches the upper physical limits of that possible with given specific gravity of medium solids. In general, work in the pilot plant at Stamford has shown that a lower weight of float is produced when a 20 deg. included angle conical section is used, than with a conical section of 60 deg. included angle. This is also true of a cylindrical section over a 60 deg. cone as compared with a plain 60 deg. cone.

Feed inlet diameter.

The feed inlet diameter in conjunction with the vortex outlet governs the through-put of the Cyclone. The normal ratio of inlet diameter to diameter of Cyclone is about 1:7 to 2:7. For each size Cyclone there is an optimum feed opening, but wide variations may be made from this without materially affecting the efficiency of the separation.

Vortex or float outlet diameter.

This opening is the same as or larger than the feed inlet and thus governs the through-put. The normal capacity of a 3-in. Cyclone with feed and vortex openings of ½ in. and 10-15 lb./sq. in. feed pressure is about 15 galls./min.; for a 6-in. Cyclone with 1¼-in. feed and vortex openings and 20 lb./sq. in. feed pressure is about 60 galls./min. The larger is this opening the greater is the specific gravity of the float medium, so that more heavies will appear in the light mineral product; conversely, a small opening decreases the specific gravity of the float medium and tends to place more light material in the apex or sink discharge.

APEX OR SINK OUTLET DIAMETER

This is perhaps the most critical of all variables. The diameter of this opening normally has only a minor effect on the volumetric capacity of the Cyclone, but small changes will materially affect the specific gravity of separation. A larger opening decreases the specific gravity of the separation and a smaller opening increases the specific gravity of separation. As an illustration, by increasing the apex opening from 0.95 in. to 1.0 in. the specific gravity of a coal separation was lowered from 1.85 to 1.73. The specific gravity of the apex discharge is usually much higher than the specific gravity of separation, and is much higher than the gravity of the airlift discharge of a static Heavy-Media cone when the same separation is effected. The apex discharge should have a whirling motion.

Specific gravity of the mixture of medium, water and solids to be separated which is fed to the Cyclone referred to as "Feed Gravity."

This, with the apex opening, is the main control of gravity of separation. With magnetite medium on coal, it

is possible (and often desirable because of the efficiency of separation and quantity pumped) to feed the Cyclone at 0.2 to 0.4 lower specific gravity than the specific gravity of separation desired. This is also true in most instances when magnetite or ferrosilicon or other heavy materials form the medium for separation of ore minerals. Where light-gravity materials such as loess are used on low-gravity separations the most efficient feed gravity approaches the separation gravity.

The higher the specific gravity of the feed, within limits of allowable viscosity, the higher the specific gravity of separation.

Pressure at which material is introduced into Cyclone.

The pressure controls the volume of material introduced to the Cyclone through a given feed opening and thus controls the centrifugal and centripetal forces acting upon the particles. In general, a high pressure, say 30 lb./sq. in., will give a more efficient separation than a lower pressure, say 10 lb./sq. in.

SPECIFIC GRAVITY AND FINENESS OF MEDIUM SOLIDS

The most suitable medium for a given separation is determined by factors such as availability, cost, ease of recovery, etc. For ease of recovery a magnetic medium is desirable. The top limits of specific gravity separations attained with various media are: Loess or slate tailings: 1.6-1.65; Magnetite: 3.0; Ferrosilicon: 3.5.

These figures are higher than those which can be obtained with similar materials in the comparatively static conditions obtaining in a conventional sink float separator.

The factors entering into the selection of the fineness of the medium are principally viscosity of finely ground medium and ore mixtures, crowding of fine ore particles by coarse medium and the specific gravity of separation desired.

In general for a given specific gravity of separation, a finer medium than that which is employed in a static Heavy-Media cone is desirable. With magnetite ground to 90-95 per cent through 325 mesh, efficient separations at 1.35 specific gravity in a static cone are possible; however, the same medium in a Cyclone makes the most efficient separation at 1.6-1.7 specific gravity. Particles coarser than necessary are detrimental because they are thrown almost immediately to the periphery causing excess wear, and crowd the particles which it is desired to separate, thus thickening the apex discharge beyond the limits of good separation.

The coarse particles, while not entering into separation, must be continually transported with the rest of the medium, and often require the use of the 60 deg. cone instead of the more efficient 20 deg. cone.

Tonnage rate

The tonnage fed to the Cyclone has little effect on the operating efficiency until the limit of ratio of separating medium to quantity of material to be separated is approached.

RATIO OF MATERIAL TO BE SEPARATED TO FLUID MEDIUM

In nearly all cases a ratio of 1 volume of material to be separated to 5 or 6 volumes of fluid medium is required. In certain instances where the medium is carefully prepared as regards maximum particle size and overall size distribution for the desired separation, a ratio of 1 to 3 or 3½ may be possible. For the sake of economy the volume of medium handled should always be kept to a minimum.

Particle size of material to be separated.

European investigators have treated coal up to 0.32 in. in a 14 in. diameter Cyclone. However, it is believed a top size of about ¼ in. is most feasible on either the 6 or 14 in. sizes, and 10 mesh on the 3 in. Cyclone. The Cyclone works more efficiently on sized feed, but can do a creditable job down to 40 mesh on coal and slightly finer on some ores. Since there is a classification and thickening effect superimposed on the separation, because of the centrifugal and centripetal forces induced, the coarser particles will be separated at a slightly lower specific gravity than the average separating gravity, while the finer particles tend to be separated at a slightly higher gravity.

VISCOSITY

The above discussion has included viscosity as an effect of the variables enumerated only. However, viscosity determines the fineness of the medium to be used and the permissible ratio of medium to material to be separated. Needless to say, a medium with the viscosity of water would be ideal, but is not practicable. The upper limit of permissible viscosity must be determined by an experiment observing the finest of the material particles to be separated.

Some typical results obtained in test work are set out below:

Oxide Tin Ore

(1) Test with 3 in. diameter cyclone; apex angle 60°.
Feed orifice ¾ in.; effluent ¾ in.; discharge ⅛ in.
Pressure: 13 lb./sq. in.
Feed gravity: 2.01. Apex discharge gravity: 2.60.
Effluent gravity: 1.93.
Medium: 80% 325 mesh magnetite.
Feed: through 10 mesh.

Results

Products	*Total* % *Wt.*	*Assay* % *Sn*	% *Distribution Sn*
Calc. head	100.0	0.94	100.0
Sink	17.0	4.49	81.3
Float	83.0	0.21	18.7
—10+65:			
Sink	17.9	4.63	87.0
Float	82.1	0.15	13.0
—65+200:			
Sink	13.6	3.78	56.5
Float	86.4	0.46	43.5

Pyrite Ore

(2) Test with 3 in. cyclone; apex angle 60°.
Feed opening ¼ in.; effluent ¼ in.; discharge ¼ in.
Pressure: 20 lb./sq. in.
Medium: 75% of 100%, 100 mesh ferrosilicon.
25% of 90%, 325 mesh magnetite.
Raw feed: through 10.
Raw ore and medium mixed in weight ratio 1:7.

Results

Product	% *Wt.*	*Assay*		% *Distribution*	
		% *Fe*	% *S*	*Fe*	*S*
Head	100.00	30.89	27.53	100.00	100.00
Sink	59.57	44.17	43.45	85.17	94.01
Float	40.43	11.13	4.09	14.83	5.99

Red Iron Ore

(3) Test with 6 in. diameter cyclone; apex angle 60°.
Diameter inlet and vortex 1¼ in.; apex 0.855 in.
Pressure: 20 lb./sq. in.
Medium: through 100 mesh ferrosilicon.
Feed: ¼ in. × 48 mesh.

Results

Product	% Wt.	Assay % Fe	Assay % SiO_2	% Distribution Fe	% Distribution SiO_2
Head	100.0	37.6	18.9	100.0	100.0
Underflow	85.3	42.3	13.9	95.9	62.9
Overflow	14.7	10.4	47.8	4.1	37.1

Lead Ore

(4) Lead ore through 6 mm. caught by 0.2 mm.
Test with 6 in. cyclone; apex angle 60°.
Feed opening 29 mm.; overflow opening 29 mm.; apex opening 23 mm.
Feed pressure: 23½ lb./sq. in.
Medium: Magnetite, 65% less than 43 microns.
Medium specific gravity 2.12.
Overflow ,, ,, 1.95.
Apex ,, ,, 2.60.

Results

Product	% Wt.	Assay % Pb	Distribution % Pb
Feed	100.0	13.74	
Sink	35.8	37.59	98.2
Float	64.2	0.41	1.8

RECENT WORK

During the summer of 1950 an experimental unit was set up on the "Iron Range" in Minnesota, to investigate the use of the cyclone in the concentration of iron ores.[4] The results of this work was so satisfactory that in 1951 a pilot plant was run continuously. Unfortunately, the companies operating these plants are not at the moment prepared to release detailed information as to the results obtained, but it was found that 12-in. diameter cyclones with 20 deg. included angles handled without trouble 35-40 tons of feed per hour. From a feed of 44 per cent Fe a concentrate averaging 58-60 per cent Fe was made. It is hoped that more details may be available when the paper is discussed.

It is not yet possible to assess accurately the cost of a complete cyclone separator unit, including medium reclamation equipment, since all the units now operating, except that at the Dutch State Mines, have been designed for pilot plant work. The author and a colleague in 1949 designed a cyclone washer for cleaning fine coal in S. Africa, and estimated that, on a basis of 40-50 tons of feed per hour, the cost would be in the region of £2,500 per ton/hour capacity. This is higher than a dense medium separator treating coarse material, but for substantial tonnages the unit cost would probably be lower.

Since the problem of mineral concentration in the cyclone is still in the development stage, this paper is of necessity somewhat elementary in its treatment. It is hoped, though, that it will serve to focus interest on the problem and to provoke discussion on the chemical engineering aspects of the subject.

The author is indebted to the directors of Cyanamid Products, Ltd., and to the American Cyanamid Company for permission to prepare and publish the paper.

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Bend and Vibratory Stress in Winding Ropes

By RICHARD SAXTON

The various stresses to which winding ropes are subjected makes it essential to use best quality material and though basic quality steel may be used at times to meet certain conditions, particularly where excessive friction is generated during contact with pulleys or drum, the general practice is to produce winding ropes from acid or special-acid material. The resultant composition, which combines great ductility and uniformity, can be cold-worked to high tensiles without detriment to quality.

WINDING ROPE CONSTRUCTIONS

Winding rope constructions may be classed in four grades: *Grade* 1.—Round or cylindrical construction. This type of construction, usually fabricated of 6 strands, 7 wires each (6 over 1), is, in general, employed for diameters of 1 in. or smaller. Beyond this, the Seale fabrication is recommended, as its use eliminates the cross-cutting usual between layers in ordinary strand constructions. Seale constructions consist of strands with two layers of wires round a centre, the outer and inner layers being made of an equal number of units, with the outer wires lying in grooves between the inner. Due to this form of fabrication, the units are in line contact throughout, thus eliminating cross-cutting. Seale constructions of 1.5 in. diameter and over, necessitate the employment of small units for the inner layer, and what is known as Modified Seale is usually fabricated, *i.e.*, 6 inner wires of equal diameter as the 12 outer, with 6 filler wires in contact.

Grade 2.—Flattened Strand. This construction consists of 6 strands of triangular section round a fibre core. An improvement in this fabrication has been the introduction of three pairs of twin wires, stranded to form a triangular core, in place of the solid triangular core originally employed. This construction has a greater percentage elongation than the solid triangular form, and it elongates equally with the other units of the strand, so that the core is not required to carry an undue share of load.

Grade 3.—Non-rotating Flat Ropes. This construction comprises an outer layer of flat strands round a core made-up of flat and round strand, or wire concentric layers, and is recommended where a flexible, non-rotating rope is essential, as in a winding where the cage clearance is small. A further factor in favour of the use of this rope is that the units in the twin wire core can be produced in a tensile equal to the main wires in the strand, thus furnishing additional or higher tensile value to the rope.

Grade 4.—Locked Coil. These ropes are distinct from strand constructions in that they are fabricated by spinning several layers of cylindrical units round a core wire, and finishing with one or more layers of shaped interlocking sections. Locked coil ropes are in increasing demand because of their efficiency in deep shafts where heavy loads and fast speeds are the general practice. In the newer constructions of this type, one or more layers of sections and rounds interlock under the full-lock covering of outer layers; this arrangement of the units distributes the stress to the interior by means of smooth surfaces

minus any cross-cutting action between the layers.

Bend Stress. The resistance wire ropes oppose to bending when travelling a pulley or sheave depends on several factors: the relative diameter of rope; the flexibility of construction and the internal friction set up between wires by their relative movement or slip when traversing the bend. In general, resistance opposed to bending varies inversely with the diameter of the pulley (arc of curvature increasing with increasing size of pulley).

The travel or running speed of the rope also affects resistance and where rope is fabricated of numerous small wires, the larger number of surfaces in frictional contact increases the resistance to bending, and where a number of units is reduced below a certain limit and the unit diameter correspondingly increased, radial pressure set up in laying the rope will also cause higher resistance, unless counterbalanced by the use of larger pulleys.

When a wire rope is bent over a sheave or pulley, a certain force is essential to achieve the bend. This bending stress or force is proportionate to the diameter of the sheave or pulley over which the rope is bent. Extremely small sheaves cause large losses, but large sheaves cause so slight a loss that it may be neglected. When bent, as in travel of sheave, an alteration in lay takes place, both on the inner and outer side of the curve, and the wires in a strand tend to move from compression to a tension zone.

During travel over pulley or sheave, every component wire must possess the facility to oscillate and revolve around its own axis to an extent essential to dissipate and distribute the bending stress, for each section of a rope, when travelling over a sheave, has to undergo two entire flexures, one on the adaptation to the sheave circumference, and the second on realigning after leaving.

The condition of sheave or pulley groove can have an adverse effect both on the bend stress and on the rope wear. If there is an imprint in the groove, a filing action will take place on the rope at every stop and start. Wear on both rope and sheave depends on pressure between the two, and incidentally, the condition of groove surface, and the greater the load the greater the pressure, with resultant greater wear. Grooves having the slightest impression or roughness should be machined and polished.

When rope radial pressures exceed the hardness value of groove material, indicating an inability of the material to support radial pressure, the rope will imprint its external shape in the groove. As a result, there is a filing action on the rope at every stop and start of the hoisting cycle where a tendency exists for the sheave to slip by the rope. The occasional touching up of all drum and sheave grooves to maintain smooth walls is an economic precautionary measure, and the prevention of groove wear is best solved by the use of the material most suitable for the purpose.

GROOVE WEAR AND VIBRATORY STRESS

To meet groove wear, experience indicates that cast-iron sheaves or drums are satisfactory where the pressure does not exceed 450 lb. per sq. in., and those made of cast steel for pressures between 800-900 lb., while manganese steel easily withstands pressures up to 2,000 lb. per sq. in. Manganese steel is recommended particularly for sheaves.

As regards vibratory stress, rapid hoisting induces severe vibrations or oscillations in a winding rope, particularly between cage and pulley, and shocks which set in action these particular rope movements are imparted in various ways, such as engine acceleration, starting with slack chains, etc. Stress in a wire rope during winding may be varied by an acceleration of the load, or be reversed by bending round a pulley or drum, which imparts compressive stress to one side of the rope.

Shocks also arise from irregularity in movement of cage, due often to longitudinal oscillations of the rope and the maximum stress may be such that, while material under visual examination reveals no apparent defect, repeated application may induce fatigue and ultimate failure.

Defect as outlined is set up most frequently at the load end of the rope, and is engendered by the oscillations travelling in an axial direction, this effect being intensified by arrestment at point near load. In all cases of stress induced by rope vibration, the maximum takes place at the point of arrestment and it is asserted by many authorities that the constant repetition and arrestment leads to a rope metal condition in which, finally, the elastic limit is exceeded with consequent deterioration.

In the raising of a loaded cage two sets of oscillations can usually be distinguished: (1) Longitudinal oscillations of rope and cage, which also affect the pulley and, to a lesser extent, the drum and opposite rope, and (2) Transverse oscillations of rope between drum and pulley. Longitudinal oscillations are most important when the cage is at the pit bottom, and throughout the wind, and transverse between pulley and drum when the cage is at pit top.

Maximum winding speeds, and the result of acceleration, have been the subject of intensive research in a number of countries, and the U.S. Bureau of Mines has published the following set of tables:

Length of rope in shaft (ft.)	*Maximum winding speed (ft. per min.)*
500 or less	1,200
500 to 1,000	1,600
1,000 „ 1,500	2,000
1,500 „ 2,000	2,000
2,000 „ 2,500	2,250
2,500 „ 3,000	2,500
3,000 „ 3,500	2,750
3,500 „ 4,000	3,000
4,000 „ 4,500	3,250
4,500 „ 5,000	3,500

Winding Speed (ft. per min.)	*Maximum Acceleration (ft. per sec.)*
750 or less	4.16
1,000	5.55
1,250	5.95
1,500	6.25
2,000 or more	8.33

New Steel Process

The huge sums invested by the British Iron & Steel Federation in metallurgical research during the post-war period have already yielded handsome dividends in fuel economy, and the development of new types of steel to meet the changing requirements of this modern age. It now transpires that in collaboration with the British Iron & Steel Research Association, the Sheffield firm of William Jessup & Sons, makers of special steel have evolved a new method of pouring high speed steel which is claimed to produce ten to twenty per cent more sound steel from a given ingot.

The new method is based, according to the technicians, upon the insertion of a "tile" of heat-resisting material into the feeder head, the effect of which is to avoid piping in the cavities within the ingot. The effect is that there is a substantial reduction in the quantity of steel which has to be recharged into the melting furnace, and whilst the process has thus far only been applied to the production of tungsten steel, it is obvious that if similar results can be achieved in the manufacture of carbon steels the new method may be attended with revolutionary results. At all events exploratory trials are now in progress to test the possibility of applying the same technique to the pouring of ingots of much larger size than those used for special steels.

The Story of Mond Nickel

So integrated into the fabric of industrial and domestic life is nickel to-day that it is difficult to realize that fifty years ago when the Mond Nickel Co. was formed the uses of the metal and the technicalities of its production were virtually unknown. In reading the story of Mond Nickel, ably written by Mr. A. C. Sturney and distinctively illustrated by Mr. Eric Fraser, one cannot fail to be profoundly impressed by the genius of Ludwig Mond whose inspiration and enterprise, courage and perseverance not only founded the company but saw it through its early struggles.

It was, of course, the discovery in 1890 of the carbonyl process by Ludwig Mond, Carl Langer and Fredericke Quincke which opened up possibilities of exploiting nickel, the qualities of which in hardening steel had been discovered in 1889. Despite the scepticism of his contemporaries, Mond decided to set up his own experimental plant at Smethwick in 1892. There he was ably assisted by Carl Langer, who concentrated on the technicalities of production while Mond gave his attention to the problem of the supplies of the raw material, the marketing of the new product and the economics of production, for costs of refining were so high as to depress sales. Properties were purchased at Garson and Denison in Ontario, Canada, and a refining plant was put into construction at Clydach, near Swansea. In 1900, the Mond Nickel Co. was registered and floated in 1901.

SLOW BUT STEADY PROGRESS

Armaments were still the chief market for the metal and the company prospered slowly but steadily. In 1908 Garson was opened up and it was decided to enlarge the plant at Clydach for which more capital was required. Accordingly in 1914 the company was reformed. The outbreak of war in 1914 brought an immediate increase in demand for the company's products. By 1918 production reached 4,400 tons as against 2,300 tons in 1913—significant proof of the company's ability to adapt itself quickly to changing conditions. Peacetime was to test that ability even more severely for with productive capacity greatly increased, the cessation of hostilities meant the virtual cessation of demand.

However, the inter-war period was to bring new uses for nickel which lead to a remarkably rapid expansion of the company's output and to a dramatic extension of its industrial and commercial associations. The rise of the motor-car industry, the increased use of nickel coinages, the entry of nickel in the form of nickel alloy into the almost untapped kitchen market, the use of nickel in the growing industry of electrical resistances materials—all these developments swelled to unprecedented proportions the demand for the company's products. Mond expanded its own production at Clydach and took over the firm of Henry Wiggin & Co. which in the war years had specialized in the production of nickel alloys. It built a specially designed factory at Acton for the recovery of the precious metals from the Clydach residues and innovated the Mond Research Department which later in 1928 printed for the public press the company's Mond Nickel Bulletin (now known throughout the world as the Nickel Bulletin). Indicative of the company's resourcefulness and industrial acumen as these important steps were, it was the merger in 1929 with the International Nickel Co. of Canada which enabled Mond not only to consolidate its existing industrial position but to press forward on a new and greater scale.

Mond was now assured of adequate supplies reaching its Clydach refinery and a number of improvements in plant and operations were introduced. The increased output at Clydach meant increased residues for the Acton refinery, where also extensions and improved techniques were put in hand. Considerable improvements were also made in the Wiggin plant and a further consolidation of the British operations was effected a year or two later when the plant of Monel-Weil Ltd. at Glasgow was acquired.

Progress was not, however, uniformally smooth. The world trade depression in the early 'thirties caused production to be severely curtailed. That revival began in the latter half of 1933—much sooner than in many other industries—may be attributed in large part to the beneficial results of the policies of research, development and publicity, prior to the merger, pursued by both companies, independently of one another, but now organized on a joint basis. However, some years previous to Mond's establishment of its Research and Development Department, Inco had sponsored research in Birmingham, Paris and Aachen, and had formed development departments in England and France. After the merger a very considerable impetus was given by Inco to this development policy. Parallel with these development departments worked the Bureau of Information on Nickel, originally started by Inco in 1927 which publicized the properties and uses of nickel and which led to the establishment of similar bureaux in Paris, Frankfurt, Brussels, Milan and Tokyo. Between them the two companies established a valuable network of information, research and development centres which were of great value in lessening the impact of the world trade depression on nickel and which played a large part in the subsequent rapid increases in consumption—for the mid-'thirties were years of extension and improvement in almost every direction.

WAR ACHIEVEMENTS

With the advent of war in 1939 the company quickly switched to the production of nickel for armaments—and for the many and varied uses for which nickel in its different forms was now required. New products such as the special platinum sparking plugs for the R.A.F. and the United States Air Force, aluminium alloys and shell cases, to name only some items from an impressive list, were supplied to the government, and a special and complete Technical and Research Unit composed of a team of the company's experts was placed at the disposal of the authorities. Among the many problems dealt with by this unit was that associated with the development of jet aircraft for it succeeded in finding a material capable of being turned into intricate turbine blades, and able to resist the abnormally high temperatures and stress involved. The new material, a modified nickel-chromium alloy—Nimonic alloys as these materials came to be called—was produced at the Wiggin works with the result that jet aircraft were in the air in 1944. Further valuable research in this field has, of course, continued to the present day.

To list adequately the uses to which nickel is being put to-day would occupy a formidable amount of space. To quote the author "Fifty years ago the important outlets for nickel could have been counted on one hand, to-day it goes everywhere"—and will go even further for the company has indicated its continuing interest in future possibilities by the establishment in recent years of the Mond Fellowships which encourage the young scientists and technicians to explore new possibilities for this versatile metal. And on this note the story of Mond Nickel closes.

Mr. Sturney is to be warmly congratulated for an unusually interesting account of the history, structure and functions of this famous company, and for the lucid manner in which he has presented his material.

MACHINERY AND EQUIPMENT

B.T.H.'s Activities in 1951

The British Thomson-Houston Company during 1951 was actively engaged in work associated with the plant and equipment for mining companies in many parts of the world.

Equipment for gold mines during the year included an order from New Consolidated Gold Fields for Venterspost Gold, calling for two 1,100 h.p. 6.6 kV, 1,480 r.p.m. drip proof slip-ring induction motors and also for six 650 h.p. machines of similar design. The larger machines were the 56th and 57th supplied since the first order was placed with B.T.H., in 1938, while the order for the smaller machines brings to 18 the number of these items supplied by the company since 1940. Venterspost has also ordered two 3,500 h.p., twin motor A.C. drives, and New Consolidated Gold Fields recently ordered two 20,000 c.f.m. six stage-motor compressors, using the Oerlikon conical diffusor system.

For the tin mining industry, B.T.H. supplied Geevor, the well-known Cornish tin producer, with a modern electric winder —the first one in this country to incorporate the Hobson device which limits the retardation of the winder, under emergency conditions, to a predetermined value. Repeat orders have also been received for vertical motors driving pumps for tin mines in Malaya. Of interest, too, is the news that one of the company's Ward-Leonard winders installed during the year by Pahang Consolidated in Malaya, had reduced that company's fuel costs to about one-eighth of the previous figure when a steam winder was in operation.

Among the orders received from Australia was one for a 150 h.p. "No-lag" Unity power factor motor for use in the production of tungsten at the Scheelite Mines on King Island.

B.T.H. were again prominent amongst manufacturers of electrical equipment supplying the coal mining industry both at home and abroad.

A considerable amount of electric underground equipment, mostly flameproof, for use in coal mines was ordered or supplied during the year, including motors, transformers, switch gear, and control gear for use in connection with conveyors, haulages, pumping plant, and for general mechanization equipment. Several orders are also in hand, and others were received during 1951 covering type A.M.T. synchronous motors for driving reciprocating air compressors at mines. In some cases these were for new or expanding installations and, in others, existing compressors driven by steam were being converted to electric drive with a view to complete colliery modernization and electrification.

Overseas, delivery of the equipment ordered by Etibank, Turkey, for more than 700 flameproof underground mining units and 3,500 flameproof fluorescent lighting fittings continued in 1951 and, in addition, B.T.H. engineers have been on the sight, acting in an advisory capacity and supervising the various installations.

The Rapid Hammer

A pamphlet received from Messrs. Adam & Harvey, Ltd., London, describes an enterprising tool patented on all world markets as the Rapid-Hammer. In practice, it is a bolt-driving gun fired in a normal fashion by a cartridge, the Hammer shooting specially hardened steel bolts into surfaces varying in texture from wood to concrete or rock. The bolts are equipped with plain heads for permanent connections and threaded heads for detachable connections. A female thread will present a finishing flush with the surface.

The British model of the Hammer is supplied in two types which differ in the weight of the machine itself and in the overall dimensions of the bolts projected. The Mark II weighs an approximate 3¼ lb., and is equipped to fire bolts of 6 mm. diameter; the Mark III weighs approximately 8 lb. and fires bolts of 10 mm. diameter. Bolts manufactured for ejection from the two models range in length from the 19 mm. with shaft 15 mm. and head 4 mm., to the 70 mm., with shaft 50 mm., and head 20 mm. The explosive force of the driving cartridges is graded to four strengths, and all factors of diameter, length and ejection force logically follow the dictates of the texture and resistance of the texture and resistance of the substance to be operated upon.

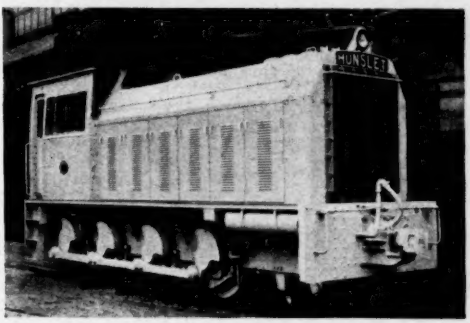
An American model, fairly similar to the Marks II and III described, has already been briefly described in relation to underground mining practice in a recently published pamphlet issued by the Anglo-American Council on Productivity.

Although its practical implications are obviously widespread, the Rapid-Hammer seems worthy of the particular attention of the mining engineer. For only surmise can assess the man-hours regularly wasted underground in drilling the pop-holes necessary to accommodate the varied fillers used for support of electric haulage cables, lighting systems, ventilation pipes, air or water blasts, etc. The necessities demand the expenditure of time and materials in their erection, with resultant financial cost.

While no extravagant claims are made for the Rapid-Hammer it is nonetheless worthy of serious consideration that the tool is utilized by a single operator and that no force is necessary other than the self contained cartridges of graded strength.

Hunslet Diesel Locomotive for Copper Belt

A special 300 h.p. diesel locomotive with four-speed mechanical transmission has been built by the Hunslet Engine Co., Ltd., Leeds, for Roan Antelope Copper Mines, Ltd., to haul 700-800-ton copper-ore trains on the level in the Rhodesian mining belt and with a regular duty repeated each shift of hauling 170 tons up 1 in 38 for three-quarters of a mile with 180-ft. radius curves. This capacity has been gained within a weight of 37 tons, a maximum axle load of 12½ tons, a height of 11 ft. 7 in. and a width of 8ft. 3 in. The rail gauge is the Rhodesian standard of 3 ft. 6 in., and the 3 ft. 9 in. wheels are spread over a wheelbase of 9 ft., short enough for curves of 125 ft. radius to be traversed. The oil engine runs at 900 r.p.m.; and the Hunslet transmission, comprising friction main clutch and pre-selective gearbox, gives track speeds of 4½, 6½, 10½ and 16½ m.p.h., respectively. Tractive effort on bottom gear step is 16,300 lb. on site, which is more than 6,000 ft. above sea level.



The special 300 h.p. Hunslet diesel locomotive as supplied to the Roan Antelope Copper Mines, Ltd.

The New Holman Pneumatic Chain Saw

The Holman Pneumatic Chain Saw is a general purpose machine suitable for the cutting of timber in the mining, forestry, and building industries. It is designed for operation by one man and may be used for vertical or horizontal cuts, and by virtue of a small set-off distance it is possible to cut close to a wall or floor. The cutting member is an endless link chain, driven through a sprocket and gearing by an exceptionally robust compressed-air vane-type motor. Each link has a cutting tooth formed on its outer edge. The chain surrounds and runs in a channel formed in the guide plate which is roughly of rectangular shape with a rounded end. The width of the cut is sufficient to allow the guide plate to follow through. The weight is 39 lb., the length of the cut is 20 in. and the width of cut is 7/16 in.

METALS, MINERALS AND ALLOYS

The large influence which the American stockpile has on the metal markets is emphasized in the half-yearly report of the American Munitions Board. In the second half of 1951, $357,000,000 of strategic materials and metals were purchased; the amount spent in the first half of the year was $462,000,000. In addition to the amount spent in the second half of 1951, materials valued at $120,000,000 were diverted from the stockpile to industry. Amongst the metals so switched were 163,500 tons of copper, 45,000 tons of aluminium, 6,000 tons of lead, 2,200,000 lb. of nickel, and 1,778,000 lb. of tungsten. Mr. Truman also authorized the withdrawal from the stockpile of 55,000 tons of copper, 10,000 tons of aluminium and 3,000 tons of lead.

COPPER.—A widespread campaign has been launched in the U.S. to try to prevent users of copper from turning to substitutes. The arguments are ranged in depth: substitutes are scarce, re-designing and re-tooling will take time, governments outside the U.S. are not so strict in limiting supplies, copper scrap is not coming forward as it should, and copper production is being expanded. Anaconda Copper has taken up the last refrain. By 1953, the Greater Bulte project and sulphide plant at Chuquicamata will add 95,000 tons per annum to present output. And towards the end of 1953, the plant at Yerington in Nevada should be adding a further 30,000 tons per annum. The company looks beyond its own confines and sees that development inside the U.S. and in other countries is likely to add another 450,000 tons of metal to the world output by 1954-55. By 1955-56, U.S. supplies of copper from domestic production and imports will be increased to 1,800,000 tons, or 20 per cent more than now. Anaconda states that there is, therefore, no necessity for consumers to consider the long-range substitution of other materials for copper. Users who are short of copper now and are likely to continue being short for some considerable time will probably emphasize the word "long-range" in the statement above.

LEAD.—Mr. Truman is reported to have signed the Bill suspending the 1½c. import duty on lead until March 31, 1953, or until the end of the national emergency, whichever is earlier. The Bill is believed to have become effective on February 12, and to contain a provision for restoring the duties when the domestic price for any given month falls below 18c. per lb.

In the face of immediate and violent criticism, the Defense Production Administration withdrew a programme of lead expansion, substituting a new plan. The new proposals anticipate an expansion by 1955 of 135,000 short tons of lead from all sources over the 1949 supply of 1,207,000 short tons. Mr. Trigg, deputy administrator of D.P.A., considers that a new goal of 1,342,000 tons should be sufficient to supply all military or civilian needs by 1955. Domestic production, including various projects under way, is expected to reach 417,000 tons by 1955: scrap will, according to estimates, provide 430,000 tons: and imports would reach 420,000 tons, leaving a gap of 75,000 tons still to be closed. The projects to raise domestic production in the U.S. by 47,000 tons include two mines belonging to St. Joseph Lead, one to produce 11,500 tons per annum commencing this year, and the other to provide 17,500 tons per annum beginning in 1954; American Smelting has a mine expected to produce 9,000 tons per annum starting in 1953; and various mines scheduled under the zinc programme will also produce 9,000 tons of lead per annum.

The average price of Mexican lead continues to droop; the f.o.b. price Monterey has fallen a further .17c. to 18.62c. A parcel of Yugo-Slav lead was sold for 18.75c. c.i.f. New York, duty (since suspended) for buyers' account.

The American Bureau of Metal Statistics publishes the total stocks of lead at the works of smelters and refiners in the U.S. as 124,080 short tons on January 1, 1952. This is about 5,000 tons less than on December 1, 1951, and roughly 13,600 tons below the level of January 1, 1951.

TIN.—Early reports from Washington state that the Indonesians asked for "a little more" than the $1.18 per lb., fixed by the agreement between the U.K. and the U.S. Later reports suggest agreement will be reached soon, and that this possibility indicates that the U.S. negotiators have gained their way over keeping the price down to $1.18. These reports also state that the Americans have put forward their ideas on points which must be embodied in any contract of this nature including: the length of the contract, and the quantities of metal and concentrates involved. The Indonesian delegation has referred these suggestions to the Government. Until a reply is sent to Washington, the negotiations are more or less at a standstill.

Great changes have taken place in the Indonesian currency and export duties. Of the minerals, only tin appears to be affected; it will bear an extra export duty of 15 per cent.

Production of Longhorn tin at the Texas City smelter during January was 1,802 l.tons. This is nominally below the December output of 1,805 l.tons, and is the lowest monthly figure for a long time, certainly for four years.

Discussions are going on concerning the withdrawals of tin from the stockpile to meet requirements in March. According to an American estimate, R.F.C. stocks of pig tin at the end of December were 6,753 tons. The Texas City smelter output of 1,802 tons in January brings the amount available up to roughly 8,500 tons. As some tin is in transit, it would probably make the tin allocation for January and February (9,000 tons) safe, but leaves no margin for March.

Thailand produced 1,055.5 l.tons of tin ore and 97.4 l.tons of wolfram ore during December, 1951, compared with 1,154.5 and 119.4 tons respectively in November.

ZINC.—According to Mr. Wilmot Bradley, Chief Geologist of the U.S. Geological Survey, vast new zinc ore deposits have been discovered in Tennessee. A map published by the Geological Survey enabled the American Zinc Company to discover 100,000,000 tons of zinc concentrates which could yield zinc to the value of $135,000,000. "This," Mr. Bradley points out, "is more zinc than has been discovered in all the rest of the United States in 39 years." The deposits are reported to be south-east of Jefferson City and 30 miles east of Knoxville.

U.S. zinc production in January totalled 83,205 s.tons (the highest January figure for some years) compared with 81,769 s.tons in December. Stocks at January 31 at 26,703 s.tons showed an increase of nearly 5,000 tons over the previous month.

The bill suspending the import duty on zinc is reported to have been signed by Mr. Truman and to have become effective on February 12. This bill is believed to contain the same provisions as those relating to lead, namely, that it shall run until March 31, 1953, or until the end of the national emergency, whichever is the earlier, and that the duty will be restored when the domestic price for any month falls below 18c. per lb.

ALUMINIUM.—Mr. Manley Fleischmann has announced that the U.S. motor industry has been allocated an extra 500 s.tons of aluminium for the April-June quarter. As he expressed the hope that this extra amount would enable the industry to approach the production of 930,000 cars in the period, it must be assumed that the aluminium is intended to remove the limitations imposed by the shortage of copper. The motor industry might or might not be pleased at this somewhat distant prospect of assistance, but it will surely annoy the copper producers.

The Bureau of Mines reports that imports of aluminium into the U.S. in 1951 were far below those of 1950; imports of pig and ingot aluminium at 123,000 tons were about 30 per cent less than in 1950. Imports of scrap amounting to 16,000 tons were less than one-quarter of the 1950 total, but imports of semi-fabricated aluminium increased from 11,000 tons in 1950 to 19,000. The domestic production of primary aluminium came to about 836,900 s.tons, or roughly 16 per cent more than in 1950, and the output of secondary aluminium rose by 11 per cent to 270,000 tons. The consumption of primary aluminium also rose by 11 per cent to 270,000 tons, but the Bureau warns readers that the apparent consumption of secondary aluminium of 962,000 tons is inflated by an unknown amount being added to the stockpile.

ANTIMONY.—The nominal quotation for antimony ore (60 per cent) was lowered on Thursday of this week to 42s. 6d./47s. 6d. per unit, c.i.f., against 45s./50s. nominal previously.

NICKEL.—The International Materials Conference seems to be more assured that it has a grip on the nickel position. It anticipates that a small quantity of nickel might be added to the world supply for distribution in March. If this hope is realized, members of I.M.C. can hope to have at least as much nickel in the second quarter of the year as in the first.

Last year the International Nickel Co. mined more ore than in any year in its history. Total production from both underground and surface operations amounted to 11,800,000 tons (of which 7,780,000 tons came from underground) compared with 9,849,000 tons in 1950. By the end of 1953 the company expects to be able to mine 13,000,000 tons per annum.

QUICKSILVER.—The American quotation continues to slide downwards, whereas it was $218-220 per flask last October, it is now down to $202-205, having lost $2 at the end of last week. Quotations in other centres appear to be unaffected; Spain maintains the price at $200 per flask f.o.b. and Italian quicksilver is fetching between $200 and $208. The U.K. quotation stands at £73½ which is equal to $206.

URANIUM.—The Africaans newspaper, Die Vaderland, is reported to have stated that the installation of refineries on certain Rand mines where uranium has already been found has progressed to the stage where large-scale production may commence in the near future. The newspaper hazards the guess that the establishment of the industry may make the Union one of the most important—if not the most important—uranium producers in the world.

The London Metal Market

(From Our Metal Exchange Correspondent)

This week has seen a weaker tendency in prices and as turnovers have been fairly heavy it is thought that this trend may continue more especially as reports from Washington suggest that the Americans are not prepared to pay to the Indonesians a price higher than that paid to the British. The American position is still one of extreme difficulty as the raw material supplies to the Texas Smelter must be diminishing at an alarming rate, and the R.F.C. stock of available tin is also being used up and it is doubtful whether the President will feel himself justified in releasing tin from the stock pile, as such an action would be open to attack from other countries on the grounds that the stock pile should not be used as a weapon in influencing international prices.

On the Continent the demand for tin has not been heavy, and France is understood to have introduced an import licensing and quota system for tin as its government considers that purchases last year were above industrial requirements.

In the other metals the main item of interest has been the announcement that the Minister of Materials received a deputation from the London Metal Exchange to hear their case for the re-opening of dealings in lead, and he has promised to consider the views expressed. Such a move has been expected for some time but it is realized that the currency question is one of paramount importance and it remains to be seen whether this obstacle can be overcome.

On Thursday the official close on the tin market was: Settlement price £989, Cash Buyers £989, Sellers £990; Three months' Buyers £988, Sellers £990. In the afternoon the market was idle. Turnover for the day was 90 tons. Approximate turnover for the week was 990 tons.

The Eastern price on Thursday morning was equivalent to £991 5s. per ton, c.i.f. Europe.

Iron and Steel

Production statistics for January reveal that the British steel plants have started the year with a most disappointing contribution towards the relief of the steel famine. Production of ingots and castings last month was at an annual rate of 15,234,000 tons compared with 14,953,000 tons in December and 15,907,000 tons in January, 1951. Happily, there was a further slight expansion in pig iron production, but progress in this direction needs to be made more rapid to compensate for what appears to be a permanent contraction in the supplies of iron and steel scrap.

Consumers are also awaiting with a good deal of trepidation an official announcement on the subject of steel prices, which is expected within the next few days. There have been prolonged consultations between the Ministry of Supply, the State Iron & Steel Corporation and the Iron & Steel Federation on this subject and it is understood that the authorized advances will not only take into account the increased cost of imported ore, coal, transport and labour but will also pass on to the consumer the burden of the high cost of steel from U.S.A. In that event a rise of £4 or £5 per ton is not improbable.

The price of steel, however, is a secondary consideration to the many industries which are starving for supplies. Even the issue of official allocations affords no guarantee that deliveries will be obtainable. The best that the Ministry can achieve under the rationing system is to share out available supplies as equitably as possible, but these are totally inadequate and even work of national importance is held up for lack of steel.

How soon the first deliveries from U.S.A. will arrive is a question which is now eagerly canvassed. The bulk of this material may not reach this country until the second half of the year, but a few earlier shipments would be of immense value. In the meantime, efforts to accelerate shipments from the Benelux countries have been attended with scant success. The Belgians are reluctant to exchange steel for sterling, and billets, slabs and sheet bars are urgently needed to keep the re-rolling

Nor is it possible to keep pace with our own extensive export commitments. Allocations for export have been issued to the end of June but this branch of the trade is very sluggish in spite of the high prices obtainable in the markets overseas.

FEBRUARY 14 PRICES

COPPER

Electrolytic	£227 0 0 d/d

TIN

(See our London Metal Exchange report for Thursday's prices)

LEAD

Soft foreign, duty paid	£170 0 0 d/d
Soft empire, including secondary lead ...	£170 0 0 d/d
English lead	£171 10 0 d/d

ZINC

G.O.B. spelter, foreign, duty paid ...	£190 0 0 d/d
G.O.B. spelter, domestic...	£190 0 0 d/d
Electrolytic and refined zinc	£194 0 0 d/d

ANTIMONY

English (99%) delivered, 10 cwt. and over	£365 per ton
Crude (70%)	£290 per ton
Ore (60% basis)	42s. 6d./47s. 6d. nom. per unit, c.i.f.

NICKEL

99.5% (home trade)	£454 per ton

OTHER METALS

Aluminium, £148 per ton.	Palladium, £8 10s. oz.
Bismuth, 28s. lb.	Platinum (scrap), £33.
Cadmium, 18s. 9d. lb.	Platinum, £27/33 5s. nom.
Chromium, 6s. 3d. lb.	Rhodium, £45 oz.
Cobalt, 20s. lb.	Ruthenium, £30 oz.
Gold, 248s. f.oz.	Quicksilver, £73 10s./£74 ex-warehouse.
Iridium, £65 oz. nom.	Selenium, 25s. nom. per lb.
Magnesium, 2s. 10½d. lb.	Silver (bar), 77d. f.oz. spot and forward.
Osmiridium, £35 oz. nom.	Tellurium, 19s. lb.
Osmium, £70 oz. nom.	

ORES, ALLOYS, ETC.

Bismuth	50% 16s. lb. c.i.f. 40% 14s. 9d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (lumpy)	£13 per ton c.i.f.
,, ,, (concentrates)	£13 per ton c.i.f.
,, ,, Refractory	£12 12s. per ton c.i.f.
Baluchistan Metallurgical ...	£14 16s. per ton c.i.f.
Magnesite, ground calcined ...	£26 - £27 d/d
Magnesite, Raw	£10 - £11 d/d
Molybdenite (85% basis) ...	103s. 1½d. per unit c.i.f.
Wolfram (65%), U.K. ...	485s. nom. c.i.f.
Tungsten Metal Powder (for steel manufacture) ...	35s. nom. per lb. (home)
Ferro-tungsten	33s. nom. per lb. (home)
Carbide, 4-cwt. lots	£30 3s. 9d. d/d per ton
Ferro-manganese, home ...	£41 15s. 11d. per ton
Brass Wire	2s. 7½d. per lb. basis.
Brass Tubes, solid drawn ...	2s. 1d. per lb. basis.

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The general trend of prices during the week has been easier. There have been two large industrial issues by Boots and General Electric which, coupled with the prospect of the Budget on March 4, have depressed the market. Gilt-edged followed. Mining issues were also quiet although some individual items have been active.

Kaffirs languished through lack of interest. Exceptionally, some of the West Rand issues were better. West Driefontein improved following the quotation on the Paris Coulisse, and Doornfontein and West Rand Consols also rose. WRITS were steady. Among producers, Randfontein improved smartly on a variety of rumours which included: Budget relief for marginal mines, extra land acquisition by the company, and reports concerning uranium. Among finance houses, Hendersons Transvaal were outstanding. Buyers came in on the company's copper prospects.

O.F.S. issues were generally down. Harmony announced that they propose to issue seven new shares at 18s. 6d. for every ten held. Following the news, the price fell to 21s. 6d. This looks as if the success of the issue may be a near thing. It is underwritten by Central Mining. It was reported from South Africa that Johnnies were negotiating for a loan in Swiss francs for the development of their O.F.S. properties; this was later denied by the Corporation. Anglo-American Corporation are also rumoured to be negotiating a loan of this type.

The January figures for St. Helena disclose a small working profit, the first in the history of the O.F.S. This is directly traceable to a decrease in working costs, occasioned by the increased quantity of payable ore milled. Welkom is still milling a high proportion of development rock and so occasioned a loss of £45,723.

The difficulties in the Western Australian field are underlined by Paringa's figures. This company ceased to operate some time ago owing to rising expenses and the debit balance carried forward is now £269,496 against £9,031 last year. On the other hand, Cam & Motor, the Rhodesian gold producer, presents a much more cheerful prospect. Good developments are reported at depth on the Cam spur lode on Nos. 38 and 39 levels. This sustains the recent improved development results. The December quarter's working profits were £92,703 against £72,576 in September.

Coppers mostly improved during the week but finished easier on end of account sentiment. The leading companies are undertaking an ambitious exploration programme over wide areas which give good long term hopes for the already established field. Rhodesia Katanga were again in demand. The shares at one time touched 16s. 6d. While no drilling results are expected for some time market sources report considerable interest from certain finance houses. Uruwira were also a bright feature, finishing at 8s. 6d. after touching 8s. 9d. Public interest was stimulated upon reconsideration of the American loan conditions to the company which produces lead/copper ore, Kentan Gold, which holds a block of the shares, also hardened to 4s.

Oil shares, which last week were firm on investment demand, boiled over, although the undertone remained steady.

Platinum issues caught the public fancy. Market circles have tended to make optimistic forecasts of coming developments. The free market platinum price is now around £51 an oz. as compared with the official London price of £27 an oz. Potgietersrust shares finished the period around 12s. 7½d. as compared with 11s. 6d. last week.

Eastern tin shares were patchy but there was generally a better tone. The political news from Malaya appears to be slightly better and General Templer has arrived out there. In the Nigerian section, Gold and Base Metal Mines were in demand and rose smartly to 5s. The market was reported to be short of stock. The company has a large interest in the new Nigerian lead field, and interesting developments are expected during the next few months. It has also announced its intention of declaring the output for the clean up of plant paddocks quarterly instead of monthly. It is expected that this will save valuable production time.

FINANCE	Price Feb. 13	+ or − on week
African & European	2⅜	−⅛
Anglo American Corpn.	7½	−¼
Anglo-French	21/-	+3d
Anglo Transvaal Consol.	33/9	
Camp Bird	12/3	
Central Mining (£1 shrs.)	38/1½	−7½d
Consolidated Goldfields	48/1½	
Consol. Mines Selection	29/4½	
East Rand Consols	3/1½	
General Mining	4⅜	−⅛
H.E. Prop.	35/-	−1/10½
Henderson's Transvaal	14/6	+1/3
Johnnies	3⅛	−⅛
Rand Mines	5¾	−⅛
Rand Selection	42/8	−1/3
Union Corporation	9⅛	−⅛
Vereeniging Estates	4⅛xd	−⅛
Writs	33/1½xd	
West Wits	44/-	−4½d
RAND GOLD		
Blyvoors	41/9	−4½d
Brakpan	17/9	−3d
City Deep	42/6	−2/6
Consol. Main Reef	40/-	−1/3
Crown	3⅜	−⅛
Daggas	3¼	−⅛
Dominion Reefs	2/10½	+7½d
Doornfontein	26/6	+10½d
Durban Deep	3½	−¼
E. Daggas	21/10½	
E. Geduld (4/- units)	46/10½	
E. Rand Props.	3⅜	−⅛
Geduld	6⅜	+⅛
Grootvlei	33/3	
Libanon	13/4½	−3d
Luipaards Vlei	17/-	−3d
Marievale	20/6	−6d
Modderfontein B.	5/4½	−1½d
Modderfontein East	31/3	+1/3
New Kleinfontein	32/6	
New Pioneer	16/-	−9d
Randfontein	19/3	+1/9
Robinson Deep	12/9	−3d
Rose Deep	32/6	−1/3
Simmer & Jack	6/3	−3d
Springs	8/9	−3d
Sub Nigel	2⅛	−⅛
Van Dyk	14/3	−3d
Venterspost	21/9	−6d
Vlakfontein	16/9	−3d
Vogelstruisbult	26/3	−6d
West Driefontein	6⅛	+¼
W. Rand Consolidated	46/10½	+7½d
Western Reefs	40/-	−7½d
O.F.S.		
Alpha F.S.A.	8/-	
Blinkpoort	19/4½	−7½d
Central Mining F.S.	3/10½	−4½d
Freddies	8/3	−7½d
Freddies N.	7/7½	−7½d
Freddies S.	8/7½	−7½d
F.S. Geduld	3	−⅛
Geofries	20/-	−1/6
Harmony	21/6	−1/9
Lydenburg Estates	10/3	
Middle Wits	19/-	−1/3
Ofsits	41/9	−9d
President Brand	16/9	−9d
President Steyn	14/9	−9d
St. Helena	20/-	−9d
U.F.S.C. & G.	7/6	−9d
Virginia Deb.	73	
Virginia Ord.	11/3	−4½d
Welkom	33/1½	−1/3
Western Holdings (New)	3⅛	−⅛
WEST AFRICAN GOLD		
Amalgamated Banket	1/10½	
Ariston	6/6	−1½d
Ashanti	25/-	−3d
Bibiani	8/3	−3d
Bremang	2/10½	
G.C. Main Reef	3/3xd	
G.C. Selection Trust	7/4½	−1½d
Konongo	3/1½	−1½d
Kwahu	4/1½	
London & African Mng.	2/-	+3d
Lyndhurst Deep	1/1½	
Marlu	1/7½	
Nanwa	6d	
Taquah & Abosso	5/3	−3d
AUSTRALIAN GOLD		
Boulder Perseverance	2/7½	
Gold Mines of Kalgoorlie	11/9	
Great Boulder Prop.	6/-	
Great Western Consol.	5/9	
Lake View and Star	18/-	−6d
Mount Morgan	16/9	−6d
North Kalgurli	15/3	+3d
Paringa	6	
Sons of Gwalia	10/-	
South Kalgurli	8/6	
Western Mining	7/6	
Wiluna	5/9xd	
MISCELLANEOUS GOLD		
Cam and Motor	36/10½	+7½d
Champion Reef	8/3	−3d
Falcon Mines	8/9	
Globe & Phoenix	24/-	
MISCELLANEOUS GOLD (contd)		
G.F. Rhodesian	6/10½	
London & Rhodesian	5/10½	+6d
Motapa	1/9	−3d
Mysore	5/-	
New Guinea	1/9	+1½d
Nundydroog	6/6	
Oceanic	3/-	
Oroville	12/6	−3d
St. John d'El Rey	33/9	−7½d
Zams	42/-	+6d
DIAMONDS		
Anglo American Inv.	5½xd	−⅛
Casts	3/6	
Cons. Diam. of S.W.A.	4½	
De Beers Defd. Bearer	78/3	+6d
De Beers Pfd. Bearer	14½	
COPPER		
Chartered	69/9	+9d
Indian Copper	4/6	
Messina	5⅛	+⅛
Nchanga	8⅜	−⅛
Rhod. Anglo-American	68/6	−2/3
Rhodesian Selection	21/4½xd	−6d
Rhokana	25⅜	−⅛
Rio Tinto	25⅛	+⅛
Roan Antelope	15/-	−3d
Selection Trust	46/10½	+7½d
Tanks	69/6	+2/6
Tharsis Sulphur Br.	51/3	−1/3
TIN (Eastern)		
Anglo-Burma	2/9	−3d
Ayer Hitam	28/9	
Bangrin	10/4½	−3d
Gopeng	16/6	+1½d
Hongkong	10/6	−3d
Ipoh	26/9	
Kamunting	12/6	−4½d
Kepong Dredging	10/3	
Kinta Tin Mines	18/-	+6d
Kramat Pulai	4/9	
Malayan Dredging	23/1½	−4½d
Pahang	18/9	+1½d
Pengkalen	12/3	−3d
Petaling	17/7½	+4½d
Rambutan	16/10½	
Siamese Tin	25/9	+4½d
Southern Kinta	16/9	−7½d
S. Malayan	29/3	−3d
S. Tronoh	22/9	+3d
Sungei Kinta	23/9	+7½d
Tekka Taiping	11/-	−3d
Tronoh	30/3	−3d
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	10/10½	−3d
Beralt Tin	25/3	−6d
Bisichi	4/6	−1½d
British Tin Inv.	19/6	−1½d
Ex-Lands Nigeria	6/9	
Geevor Tin	16/6	
Gold & Base Metal	5/-	+10½d
Jantar Nigeria	7/6	
Jos Tin Area	11/3	
Kaduna Prospectors	4/3	
Kaduna Syndicate	6/-	
London Tin	6/6	
Ribon Valley	1/4½	+1½d
United Tin	3/1½xd	
SILVER, LEAD, ZINC		
Broken Hill South	52/-	−1/6
Burma Corporation	3/6	−1½d
Consol. Zinc	31/-	−3d
Lake George	22/6	
Mount Isa	41/3	−9d
New Broken Hill	26/3	+3d
North Broken Hill	68/6	−6d
Rhodesian Broken Hill	19/7½	−4½d
San Francisco Mines	32/6	−9d
Trepca	3/10½	+6d
MISCELLANEOUS BASE METALS & COAL		
Amal. Collieries of S.A.	48/9	−1/3
Associated Manganese	53/3	
Chinese Engineering	4/-	−4½d
C.P. Manganese	52/-	
Natal Navigation	3⅛	−⅛
Wankie	18/-	+1½d
Witbank Colliery	2⅜	
CANADIAN MINES		
Dome	$30½	+$½
Hudson Bay Mining	$118	+$5
International Nickel	$88½	+$½
Mining Corpn. of Canada	£6⅜	
Noranda	$150	
Quemont	£8⅜	−¼
OIL		
Anglo-Iranian	6⅛	+⅛
Apex	48/9	
Attock	24/4½	
Burmah	63/9	+7½d
Canadian Eagle Bearer	32/6	−9d
Mexican Eagle	23/7½	−4½d
Shell	4⅛	−⅛
Trinidad Leasehold	32/-	−9d
T.P.D.	32/6	
Ultramar	35/6	−9d

RAND DECEMBER QUARTERLIES

Development results of the Rand gold producing companies during the last quarter of 1951, showed up well, though profits were down and premium gold sales lower.

Estimates of ore reserves were announced by those producers whose financial year ends with the calendar year; they constitute the majority of the mines, and a feature common to all, was the reduction shown in the aggregations. Rising costs has necessitated a good deal of marginal ore becoming unpayable.

The decline in revenue from premium sales affected all the operating companies, though the scale of fluctuation varied greatly. The total extra revenue from sales of gold for industrial and artistic purposes, according to the Transvaal Chamber of Mines during the December quarter brought in additional revenue totalling £1,188,732 compared with £1,636,388 in the previous quarter, £1,929,894 in the June three months and £1,937,977 in the first quarter of 1951.

As sales of gold in the "free" market from Rhodesian, West African and other mines are being negotiated, the current quarter may witness a set-back in price. According to Continental and other quotations, however, it is maintaining its value, so far, at a premium of about $3½ above the statutory value of $35 imposed by the United States.

CENTRAL MINING—RAND MINES GROUP

The result of mining work done during the December quarter by the gold-producing members of the Central Mining group made cheerful reading. More development was accomplished by Blyvoor and out of the 4,605 ft. sampled on the Carbon Leader 95 per cent was payable with an average value of 48.5 dwt. over 12 in. equal to 582 in.-dwt. against 580 the previous quarter.

Rose Deep also did a larger footage of work and of the 7,940 ft. sampled, the percentage payability was the same as in the previous quarter, 40 per cent: the value being 308 against 346 in.-dwt.

The payable ratio of footage sampled by both Crown Mines and Consolidated Main Reef was lower as likewise the value. While the 14,516 ft. of development on East Rand Proprietary compared favourably with that of the previous quarter, the 3,890 ft. (against 4,750 ft.) sampled gave a pay ratio of only 55 per cent compared with 76 previously but the value of 477 in.-dwt. was better.

City Deep's results showed an improvement over those of the previous three months; payability of the lower footage sampled, 5,825 ft., gave a ratio of 34 per cent (against 23), while value was 387 in.-dwt. compared with 302. The company's capital funds were exhausted during the quarter, and of the total net expenditure of £106,447, profits provided £18,476.

A small footage of work was done on Modder B, with payable results; as also on New Modder. This one-time leader of the Far Eastern Rand has given notice officially to the S.A. Minister of Mines that mining and milling operations will cease on 31st March next. The other member of the Modder group, Modder East, did not make a very bright showing; the footage of new ground opened up was lower and of the 2,875 ft. sampled, the pay ratio was better at 17 per cent (against 10) but value went back to 175 in.-dwt. against 186.

ANGLO AMERICAN CORPORATION

Only one member of the Anglo American group—South African Lands—was able to show an increase in profit during the December quarter. The total of £258,566 registered an increase of £12,536 which was neutralised to some extent, by a fall of £5,767 in the revenue from premium sales. A larger footage of development was accomplished and, of the 14,405 ft. sampled, 45 per cent (41 per cent previously) proved payable, with a value of 409 in.-dwt. against 361.

Developments on the other mines were, in the majority of cases, lower, though results were satisfactory. An improvement was shown by Brakpan, and although the 11,860 ft. sampled was less than previously, payability rose to 30 per cent against 23, and the value to 609 in.-dwt. compared with that in the September quarter of 442 in.-dwt. Springs pay ratio on the Main Reef Leader was also better—42 against 38 per cent—while the value of 402 in.-dwt. went against 379 in.-dwt. 1,554 ft. was opened up on the Kimberley Reef but the pay ratio of the 1,330 ft. sampled was again low, being 12 per cent against 13 and the value coming out at 252 in.-dwt. whereas previously it was 299.

Kimberley Reef developments on both Daggafontein and East "Dagga" continued to give encouraging results. 8,646 ft. was opened up on the former mine and of the 7,365 ft. sampled, 44 per cent (against 41) was payable, the value being the best for several quarters—546 in.-dwt.

There was little of note in Western Reefs quarterly development of 20,437 ft. Of the 10,150 ft. sampled, 36 per cent (against 40) proved payable, the in.-dwt. figure being 388 as compared with 404 in the September three months. The company did additional work on farm Goedgenoeg, which is outside its Mining Lease Area but it holds rights under the Reserves Minerals Development Act. It opened up 280 ft. of payable ore averaging 19.43 dwt.

CONSOLIDATED GOLD FIELDS

A sharp fall in ore reserves of Robinson Deep and confirmation of reports of higher value developments at West Driefontein were outstanding features in the Gold Fields quarterlies. All the footage of 3,965 sampled on the Carbon Leader at this latter mine proved payable with values averaging 15.3 dwt. over a stoping width of 45 in., equal to 689 in.-dwt. This compared with 500 in.-dwt. in the September quarter and an average of 630 in.-dwt. in the year to June 1951.

Libanon sampled 700 ft. on the Contact reef, of which 49 per cent was payable averaging 266 in.-dwt. No development took place at Doornfontein; it is expected to resume this towards the middle of the year. Work in connection with the Annan shaft proceeded, together with the installation of the main steelwork on six stations. No. 1 shaft was sunk to a depth of 1,602 ft. Progress was made with work in connection with the erection of the reduction plant.

There was a drop in values at Sub Nigel—295 in.-dwt. against 372 in.-dwt. the previous quarter and 430 in the June three months. Payability percentage remained unaltered at 33. Not so much development took place on the mine and only 8,455 ft. were sampled against 10,300 previously.

For the third successive quarter, Venterspost's pay ratio was down 57 per cent against 65 and 73 per cent in June of last year.

Both Vlakfontein and Vogelstruisbult added to their reserve tonnage, although developments were not so good as in the previous quarter. Of the latter mine's 12,754 ft. of new ground opened up, 8,100 ft. were sampled for a pay ratio of 47 per cent (against 52) and value of 290 in.-dwt. Vlakfontein's value of 385 in.-dwt. went against 409 and payability 26 per cent compared with 32.

Simmer & Jack's pay ratio was 42 per cent against 44, and that of Luipaards Vlei, 63 per cent against 67.

UNION CORPORATION

Development results obtained during the past quarter by members of the Union Corporation were notable for a sharp recovery in East Geduld's percentage payability. This rose to 65 as against 32 per cent in the previous three months and 52 in the June quarter. This was excluding a small unpayable footage on the Kimberley reef. The pay ratio of Black reef sampled by Geduld rose from 9 to 24 per cent but the value of 220 in.-dwt. went against 270 previously. Rather less development was done—4,384 ft., of which 3,210 ft. were sampled. A big drop of 500,000 tons was shown in the mine's ore reserves at the end of December last to 3,500,000 tons of 3.4 dwt.

Contrariwise, Grootvlei's ore reserves registered an increase of 500,000 tons to 15,500,000 tons of 4.7 dwt. Of the 12,523 ft. developed, the footage on reef and sampled was 8,370 ft., of which just over one-half was payable having an average assay value of 12.6 dwt. over 17 in. or 214 in.-dwt.

Another of the "Union" members to announce a rise in ore reserves was Marievale by 200,000 tons to 3,200,000 tons of 5.5 dwt. Development took place on both the Main and Kimberley reefs; the pay ratio on this latter of the 1,100 ft. sampled dropped to 20 per cent against 55 the previous quarter, but the value was better at 434 in.-dwt. against 297 in.-dwt. The main reef percentage payability of 41 compared with 50 per cent previously and the value was lower at 256 in.-dwt.

New ground opened up by Van Dyk of 13,675 ft., included development from the No. 5 shaft area where, during the quarter, 1,155 ft. were sampled, of which 30.3 per cent were payable with an average of 220 in.-dwt. This represents some improvement on the September quarter's figures, when only 21.5 per cent were payable with 157 in.-dwt.

JOHNNIES GROUP

The most conspicuous feature in the reports of the mines under the aegis of the Johannesburg Consolidated was the substantial drop in the ore reserves of Randfontein; the figure of 4,090,000 tons showed that they had fallen by 1,460,000 tons and are now little above the level at which they stood before the gold price rise in 1949. Their value is somewhat higher, 3.0 dwt. against 2.7 dwt. Development footage sampled during the quarter was 12,325 ft., of which 31 per cent was payable, having an average value of 5.8 dwt. over 45 in. (261 in.-dwt. against 234 the previous quarter). Working costs rose by 2d. per ton to 27s. 11d. and thus brought the profit per ton down to 1s. 5d. or a total of £72,417, to which was added £52,251 from sales of gold at enhanced prices.

Of the other four members of the group, all in the sere and yellow leaf, Witwatersrand Gold worked during the quarter for a profit of 1d. per ton, or £1,087 but premium gold brought in an additional £8,121. 1,080 ft. of development footage was sampled, of which 630 was payable of 5.1 dwt. New State Areas worked at a profit of 3d. per ton—or £1,567 with gold sales at enhanced prices bringing in a further £9,244. There was a further dwindling of payable reef percentage, the figure being 40 against 50 per cent previously, having an average value of 8.5 dwt.

East Champ d'Or sampled the small footage of 375, of which 155 ft. was payable of a value of 7.1 dwt. The mine's profit kept up well at £31,624 (6s. 8d. per ton) and was added to by £5,930 from premium gold.

The percentage payability of the 9,815 ft. sampled by Government Areas was very similar to that of the previous quarter —58—and the value of 200 in.-dwt. went against 225.

GENERAL MINING—ANGLO TRANSVAAL

West Rand's development payability and value were not so good; the 54 per cent ratio and value 312 in.-dwt. went against 61 per cent and 321 in.-dwt. in the September quarter. A decline was also shown in the ore reserves. At the end of December, fully developed reserves amounted to 9,062,000 tons of 3.4 dwt.—representing a drop of 985,000 tons. The latest total excludes 667,000 tons acting as shaft pillars on the Main and Kimberley reefs. South Roodepoort accomplished a good footage, and of the 3,120 ft. sampled, 34.6 per cent was payable of 11.6 dwt. or 289 in.-dwt.

Developments on the Main reef series of Rand Leases showed up better with payability of the 5,020 ft. sampled rising to 60 per cent and the in.-dwt. to 285. Work done on the South, Bird and Kimberley reefs gave satisfactory results.

Improvement in values and maintenance of high payability (virtually 100 per cent) were features in the report of Stilfontein Gold (Strathmore management), whose property is in the Klerksdorp district. 10,451 ft. of development were completed from the Charles shaft. Of 4,170 ft. sampled on the Vaal reef, 4,040 ft. were payable, equal to 97 per cent, averaging 59.3 dwt. over 5.5 in. or 326 in.-dwt. Work on the Contact Reef horizon from the Margaret shaft was stopped in November and will be resumed during the current year. This shaft was 2,954 ft. deep on 31st December. The Vaal reef is expected at about 3,600 ft.

COMPANY NEWS AND VIEWS

Orange Free State's December Quarterlies

The most promising feature in the Anglo American group of Orange Free State mines was the announcement by Welkom Gold of high-value Basal reef strike in a borehole on Alma 64, situated 4,500 ft. west-south-west of the No. 2 shaft. The Basal reef was intersected at a depth of 1,295 ft. averaging 112 dwt. over a true width of 10.9 in. equal to 1,221 in.-dwt. The Leader reef at 1,208 ft. gave 3.5 dwt. over 51.6 in., or 181 in.-dwt. The quarterly results showed that development in the mine was maintained, payability being 63 per cent and average values 44.85 dwt. over 8.33 in. or 374 in.-dwt. Additionally 230 ft. were sampled on the "B" reef and 24 per cent was payable averaging 540 in.-dwt.

Of "Anglos" other O.F.S. mines—Western Holdings gave progress in connection with its two shafts and confirmation of the Basal reef intersections announced last November. Results of driving towards the two rich Geduld boreholes are now eagerly awaited. Shaft sinking and plant construction news were given in Free State Geduld's quarterly. That of President Steyn confirmed the cutting of the reef in No. 1 shaft and reported good progress with plant construction. President Brand gave general news of progressive work on the property, and Loraine Gold reported similarly.

The gloomy forecast regarding St. Helena (Union Corpn.) was not borne out by information in the report. Payable footage developed of 1,685 ft. was actually 50 per cent greater than that for the December 1950 quarter.

Since Freddies North quarterly appeared, the company has announced Basal reef intersection in No. 2 shaft at 5,014 ft. below collar. Full exposure of reef over perimeter of shaft was completed at depth of 5,020 ft. The other member belonging to "Johnnies"—Freddies South—confirmed intersection of Basal reef in No. 1 shaft.

The only fresh news of importance in "Geoffries" (General Mining) quarterly statement was that borehole W.N.6 on farm Weltevreden 205 had reached a depth of 6,786 ft. without making reef strike.

Harmony Gold (Central Mining) reported that the ventilation shaft was sunk 733 ft. to 3,148 ft. and the No. 3 shaft, 566 ft. to 2,540 ft.

At Virginia (Anglo Transvaal), a total of 2,329 ft. of development was done from No. 2 and No. 3 shafts, and of the 1,150 ft. sampled from this latter, 20.9 per cent proved payable averaging 14.3 dwt. (286 in.-dwt.).

It has been decided to defer the start on the reduction plant at Merriespruit until the mine has reached a more advanced stage and that the 25,000 tons p.m. unit which was begun, be taken over by the Virginia mine.

Petaling Tin Distributes 150 Per Cent

Petaling Tin, which is incorporated in Malaya, has recommended a final dividend of 30 per cent, making, with the four interims of 30 per cent each, a total of 150 per cent for the year ended October 31, 1951. This aggregate distribution compared with the previous year's total of 85 per cent, comprising two interim payments of 30 per cent each and a 25 per cent final.

A summary of the profit and loss account, for the year ended October 31, 1951, disclosed that profit on mining operations totalled £1,013,603 compared with £533,894 in the previous year and that net profit, after providing for all charges including £259,000 (£81,882) for taxation was £645,880 against £376,535.

General reserve was strengthened by the allocation of £116,667 (£175,000), dividend distributions aggregating 150 per cent (85 per cent) on the company's $4,400,000 issued capital absorbed £539,000 and the carry forward at the fiscal year end amounted to £109,222 against £119,009 brought in.

The general manager's report states that prospects for the current year are favourable and the commissioning in the near future of the Central Electricity Board's new power station at Klang, should ensure an improved power supply for No. 6 dredge.

Rand and O.F.S. Mine Returns for January

Beginning with the returns for January, 1952, *The Mining Journal* is proposing to publish the monthly South African mine returns in comparative form, instead of merely publishing the figures for the month as hitherto. In the table accompanying this note the January figures are compared with the figures for the preceding month and for the last complete year. This has been done because the majority of the companies end their financial year in December. In subsequent months, however, it is intended that the table will be arranged a little differently and will show the figures for the current month followed by the cumulative figures since the end of the last financial year, compared with the cumulative figures for the corresponding period of the year before.

A more favourable showing generally was made by the Rand gold mining companies in January, and the two O.F.S. producers worked to better account. Of the 44 mines announcing returns, 33 milled more ore, seven dealt with lower tonnages and four the same as in the previous month. Increased profits were made by 24 Rand producers, while those of 18 were reduced. Welkom's loss was lower than that of the previous month and St. Helena made a small profit. That mine, with 23 Rand producers announced a downward trend in costs; 17 others registered an increase and two worked for the same figure as in the previous month.

	January, 1952			*December, 1951*				*Last Complete Financial Year*			
Company	*Tons* (000)	*Yield* (oz.)	*Profit* (£000)	*Tons* (000)	*Yield* (oz.)	*Profit* (£000)	*Yr. ends*	*Tons* (000)	*Yield* (oz.)	*Profit* (£000)	
Gold Fields											
Libanon	78	14896	33.8	74	14060	30.2	J	986	178,300	553.3	
Luipaards V.	100	18586	52.0	95	17754	48.3	J	1215	225,466	783.7	
Rietfontein	27	6052	29.1	26	5831	28.1	D	326	72,666	371.0	
Robinson	114	18525	10.7	112	17948	9.3	D	1350	213,337	130.0	
Simmer & J.	130	20680	25.1	126	20131	24.3	D	1508	239,772	360.9	
Sub Nigel	69	24060	133.7	64	22512	121.6	J	796	296,193	1851.1	
Venterspost	99	22197	60.1	97	20908	55.0	J	1263	266,302	1110.8	
Vlakfontein	37	13821	80.2	36	13426	77.3	D	444	165,599	964.2	
Vogels	83	20754	79.8	76	19760	77.1	D	929	234,399	988.6	
Anglo American*											
Brakpan	114	21236	46.0	114	21406	45.9	D	1375	258,755	666.6	
Daggas	233	55720	404.0	239	57159	416.0	D	2810	688,378	5193.1	
East Daggas	95	17106	69.1	96	17281	71.4	D	1183	216,352	978.8	
S.A. Lands	109	19797	75.8	117	20662	87.2	D	1380	241,993	978.8	
Springs	161	21266	21.7	165	21704	25.6	D	2004	261,107	378.7	
W. Reef Ex.	108	22830	107.6	110	23229	112.4	D	1222	268,788	1354.8	
Welkom	36	4101	L45.7	33	3323	L53.7	D	—	—	—	
Central Mining											
Blyvoor	112	70277	628.0	104	65779	586.3	J	1093	772,268	7140.9	
City Deep	155	31570	39.0	155	31791	51.8	D	1955	394,834	817.3	
Consol M.R.	188	26061	34.8	186	25571	35.2	J	2261	305,179	620.9	
Crown	268	45660	46.5	251	44308	50.5	D	3242	552,878	1081.9	
D. Roodep't	173	30328	82.2	175	30576	93.3	D	2150	370,018	1201.2	
East Rand P.	215	46774	175.6	211	44313	151.8	D	2624	537,090	2106.8	
Modder B.	58	6260	8.1	54	6184	8.0	D	648	74,371	108.0	
Modder East	120	13779	25.9	115	13569	29.1	J	1457	174,225	587.4	
New Modder	22	2933	0.8	20	2849	0.8	J	282	33,599	48.7	
Rose Deep	84	11461	14.1	81	11211	14.1	D	993	140,001	242.6	
Welgedacht	35	4022	4.0	33	3866	4.0	J	396	45,988	48.9	
J.C.I.*											
E. Champ	31	4964	10.1	30	4928	11.3	D	388	58,406	131.4	
Govt.G.M.A.	230	32913	50.1	220	31386	50.3	D	2746	377,712	658.9	
New State	42	6744	1.1	40	6997	1.0	D	688	91,485	28.2	
Randfontein	351	42502	30.0	338	39925	30.7	D	4097	493,417	510.4	
Wit. Gold	61	6901	2.6	58	6885	2.6	D	708	81,924	38.3	
Union											
East Geduld	146	43798	347.4	140	42004	334.5	D	1738	521,470	4247.2	
Geduld Prop.	108	15670	40.4	102	14820	40.5	D	1259	184,426	535.8	
Grootvlei	195	42400	271.3	190	41321	260.2	D	2338	520,407	3481.5	
Marievale	62	15412	72.6	59	14669	70.6	D	729	181,107	891.9	
St. Helena	43	8277	0.5	41	7305	L11.8	D	—	—	—	
Van Dyk	106	15651	12.5	100	15106	13.9	D	1204	181,757	202.8	
General Mining*											
S. Roodep't	28	6336	23.3	26	5791	21.0	J	321	71,898	271.2	
W. Rand Con	201	31557	121.8	210	33231	133.9	D	2537	403,894	1874.1	
Anglo Transvaal*											
N. Klerksd'p	10	1215	1.2	10	1193	1.3	D	110	13,075	15.3	
Rand Leases	184	31035	81.4	180	30465	72.9	J	2222	360,582	1114.7	
Village M.R.	34	5350	17.2	34	5349	18.0	J	415	63,150	230.9	
Others											
N. Kleinf't'n	106	13932	34.0	102	13599	35.0	D	1279	167,277	485.8	
Spaarwater	11	2348	L2.9	10	2320	L2.4	D	124	28,226	L26.0	
W. Nigel*	10	—	0.4	10	—	0.4	J	119	—	21.7	

Notes.—Profit figures are in all cases figures of working profit excluding profit from sale of gold at premium prices. In case of groups marked with an asterisk (*) profit includes sundry revenue. Profit figures preceded by L indicate a loss.

Company Shorts

Anglo-French Maintains Steady Progress.—A preliminary announcement from the Anglo-French Exploration Company covering operations for the year ended December 31, 1951, showed that profit for the year was £89,605 compared with £78,784 previously, and that net profit, after providing for all charges, including taxation liabilities of £44,569 (£38,328), was £33,833 compared with £31,196 in the preceding year.

The company is recommending the payment of 7½ per cent (same) although the current payment is being distributed on capital increased by £250,000 to £1,000,000 in October last. It is stated that expenses in connection with the issue, which have been written off, amounted to £2,168. The net dividend required £31,500 and the carry forward at the fiscal year end was £29,110 against £28,945 brought in.

Harmony Gold to Offer Seven for Ten at 18s. 6d.—The terms of the Harmony Gold Mining issue have now been announced. The directors have decided to raise the sum of £5,180,000 by the issue of 5,600,000 shares of 5s. each at 18s. 6d. (South African currency) a share. The shareholders of Harmony (other than Central Mining Free State Areas and New Consolidated, Free State, Exploration) will have the right to subscribe for seven new shares for every ten held. Shareholders of Central Mining Free State Areas will have the right to subscribe for one new share for every twenty C.M.F.S.A. shares held and shareholders of New Consolidated (other than C.M.F.S.A.) will be offered fifteen for every forty-four held in New Consolidated.

A form for exercising rights will be despatched on March 7. Consent of the U.K. Treasury has been obtained to such portions of the issue as may be subscribed in this country and application has been made for permission to deal in and for quotation for the shares in London and in Johannesburg. The issue has been underwritten by the Central Mining and Investment Corporation for a cash consideration of 2½ per cent.

The issue will raise £5,180,000 and after providing for expenses in connection with the issue, including the underwriting consideration, the company will be left with about £3,250,000 with which to continue work on the property. This amount, it is estimated, should be sufficient to provide for early development at the ventilation shaft, to carry the sinking of No. 3 shaft nearly to completion and to enable substantial progress to be made with the construction of a reduction plant having an initial capacity of 45,000 tons a month.

The present issued capital of Harmony is £2,000,000 in 5s. shares, which are currently quoted at 21s. 6d. and at this price the "rights" to Harmony shareholders would be worth 1s. 9d.

Further details of Harmony's issue appear on page 180.

Natal Coal Exploration.—Details have now been published about the Natal Coal Exploration Company, which has been granted a mining lease giving it exclusive gold mining rights in respect of certain farms in Natal, totalling 5,974 acres in extent. Additionally the company has obtained freehold coal rights over a further 3,090 acres and also holds prospecting contracts for an indefinite period over two farms comprising an area of 3,528 acres. Excluding these two farms, it is estimated that the mining area contains marketable reserves of first grade coal, of the order of 28,000,000 sales tons, after making allowance for normal loss in mining and washing.

The colliery will be operated electrically throughout and coal preparation plant having an input capacity of 360 tons per hour, has been ordered. On the basis of present day production costs and selling prices for coal, it is estimated that on a planned output of 810,000 sales tons per annum, net distributable profits of £158,500 per annum should be earned after providing for taxation, royalties and expenses. The production stage, it is stated, should be reached early in 1954.

The authorized share capital in shares of 5s. each is £1,250,000, of which £1,200,000 has been, or is to be issued.

Shareholders of New Monteleo are being offered 2,648,524 shares at 5s. 6d. per share and 238,820 shares are being offered to shareholders of Anglo-Union Mining & Industrial Corporation at 5s. 6d. The offers to these two companies is being underwritten by African & European Investment for a cash consideration of 2½ per cent on the issue price.

No loan capital has been created; no charges exist on any part of the company's assets; the share are all one class, and carry equal rights. A quotation in respect of 4,800,000 5s. shares on the Johannesburg Stock Exchange has been obtained and application has been made to the Council of the London Stock Exchange for permission to deal under Rule 163.

Should the company reach its planned output of 810,000 tons per annum, thereby having available net distributable profits of £158,500, this would be equivalent to 13.2 per cent on the shares at par and 12 per cent at the issue price of 5s. 6d.

HARMONY GOLD MINING CO. LTD.

(Incorporated in the Union of South Africa)

The following is the text of a Circular issued to Shareholders on the 8th February, 1952:—

INCREASE OF CAPITAL

We have to inform you that the resolution authorizing the Directors of this Company to offer up to 6,800,000 shares for subscription by such persons at such price and upon such terms as they may determine, was passed at an Extraordinary General Meeting held in Johannesburg on the 5th February, 1952. In terms of this resolution, the Board has decided to raise the sum of £5,180,000 by the issue of 5,600,000 shares.

Since February, 1951, expenditure at the Company's property has been financed by means of temporary loan facilities granted by The Central Mining & Investment Corporation Limited and two associated companies. These funds will be sufficient to meet expenditure until the fresh capital is raised, when, after repayment of the loans, the Company will be left with about £3,250,000 with which to continue work on the property. This amount should be sufficient to provide for early development at the Ventilation Shaft, to carry the sinking of No. 3 Shaft nearly to completion and to enable substantial progress to be made with the construction of a reduction plant of an initial capacity of 45,000 tons a month.

OFFER OF 5,600,000 SHARES OF 5s. EACH AT 18s. 6d. PER SHARE

The Board of Directors has decided to make the abovementioned offer as follows:—

1. To shareholders of this Company (other than Central Mining Free State Areas Limited and New Consolidated, Free State, Exploration Company Limited).
2. To shareholders of Central Mining Free State Areas Limited.
3. To shareholders of New Consolidated, Free State, Exploration Company Limited (other than Central Mining Free State Areas Limited).

The said shareholders of this Company who are registered in the books at the close of business on the 22nd February, 1952, *will have the right to subscribe for new shares at the price of* 18s. 6d. (*South African currency*) *per share*, payable in full on exercising the right, in the proportion of SEVEN new shares for every TEN shares held by them, fractions of a new share being disregarded.

The said shareholders of Central Mining Free State Areas Limited who are registered in the books of that Company at the close of business on the 22nd February, 1952, will have the right to subscribe for the abovementioned new shares in Harmony Gold Mining Company Limited at the price of 18s. 6d. (South African currency) per share, payable in full on exercising the right, in the proportion of ONE new share for every TWENTY shares held by them in Central Mining Free State Areas Limited, fractions of a new share being disregarded.

The said shareholders of New Consolidated, Free State, Exploration Company Limited who are registered in the books of that Company at the close of business on the 22nd February, 1952, will have the right to subscribe for the abovementioned new shares in Harmony Gold Mining Company Limited at the price of 18s. 6d. (South African currency) per share, payable in full on exercising the right, in the proportion of FIFTEEN new shares for every FORTY-FOUR shares held by them in New Consolidated, Free State, Exploration Company Limited, fractions of a new share being disregarded.

Fractions cannot be consolidated by virtue of holdings in this Company and Central Mining Free State Areas Limited and New Consolidated, Free State, Exploration Company Limited.

The Transfer Books and register of members of this Company will be closed from the 23rd February, 1952, to the 29th February, 1952, both days inclusive.

A Form for exercising rights, with provision for renunciation to third parties, will be despatched on the 7th March, 1952.

The latest date for receiving Forms exercising rights will be Friday, the 28th March, 1952.

The consent of H.M. Treasury has been obtained to such portion of this issue as may be subscribed in the United Kingdom in compliance with the Order made under Section 1 of the Borrowing (Control and Guarantees) Act 1946; it must be distinctly understood that in giving this consent the Treasury does not take any responsibility for the financial soundness of any schemes or for the correctness of any of the statements made or opinions expressed with regard to them.

Application has been made to the Council of The Stock Exchange, London, for permission to deal in and for quotation for the shares now offered. Application has also been made to The Johannesburg Stock Exchange for quotation.

This issue of 5,600,000 shares has been underwritten by The Central Mining & Investment Corporation Limited for a cash consideration of 2½ per cent calculated on the issue price of the shares. It is estimated that expenses in connection with this issue, including the underwriting consideration, will amount to approximately £135,000.

The following information is furnished in terms of Section 70 quin. of the Companies' Act of the Union of South Africa in regard to the interests of the Directors in the underwriting agreement with The Central Mining & Investment Corporation Limited:—

Mr. W. H. A. Lawrence is a Director and General Manager in Johannesburg of The Central Mining & Investment Corporation Limited and is the registered holder of 500 Preference Shares and 250 Ordinary Shares in that Corporation.

Messrs. W. M. Frames and G. V. R. Richdale are Managers in Johannesburg of The Central Mining & Investment Corporation Limited; Messrs. P. H. Anderson, E. J. F. Harrington and T. Reekie are Assistant Managers and Messrs. R. E. M. Blakeway, G. S. L. Burke, R. D'A. Clay and D. D. McIldowie are officials of that Corporation.

Should you for any reason be absent from your registered address during the period of the offer, we advise you to arrange for some other person to deal with the offer on your behalf.

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December Mine Returns

Gold

WEST AFRICA

Amalgamated Banket.—47,798 tons yielded 8,898 oz.; profit £24,151.
Ariston.—28,110 tons yielded £115,194; profit £44,700.
Ashanti.—20,000 tons yielded 16,020 oz.; profit £142,070.
Bibiani.—30,000 tons yielded 6,018 oz.; profit £14,948.
Bremang.—Three dredges treated 589,000 cu. yd. yielded 4,015 oz.; profit £23,056.
Gold Coast M.R.—8,144 tons yielded 3,335 oz.; profit £13,119.
Konongo.—2,310 tons yielded 2,190 oz.; profit £9,784.
Marlu.—41,100 tons yielded 3,965 oz.; profit £12,457.
Nanwa.—3,200 tons yielded 761 oz.
Taquah.—21,300 tons yielded 4,888 oz.; loss £5,881.

INDIA

Champion.—13,640 tons yielded 6,013 oz.
Mysore.—15,900 tons yielded 6,417 oz.
Nundydroog.—20,895 tons yielded 4,491 oz.
Ooregum.—9,767 tons yielded 2,410 oz.

AUSTRALIA

Boulder Pers.—10,554 tons yielded 2,472 oz.
Central Norseman.—(Dec. 5-Jan. 1) 11,532 tons yielded 4,166 oz.
Croesus Prop.—7,153 tons yielded 1,652 oz.
Golden Horse Shoe.—79,189 tons of tailings yielded 878 oz. gold and 742 oz. silver.
Gold Mines of Kalgoorlie.—(Dec. 5-Jan. 1) 12,798 tons yielded 3,350 oz.
Harrietville (Tronoh).—(Dec. 16-Jan. 12) 120,200 cu. yd. dredged yielded 511 oz. Value £A.7,670.
Kalgoorlie Enterprise.—3,952 tons yielded 1,273 oz.
Kalgurlie Ore.—10,722 tons yielded 2,975 oz.
Lake View & Star.—(Dec. 5-Jan. 1) 49,052 tons ore and 47,709 tons tailings yielded 11,378 oz.
New Coolgardie.—(Dec. 5-Jan. 1) 4,086 tons yielded 2,322 oz.
Sons of Gwalia.—(Dec. 5-Jan. 1) 5,702 tons yielded 1,453 oz.

Tin

MALAYA

Ampat.—122¼ tons tin conc.
Batu Selangor.—29½ tons tin conc.
Berjuntai.—92¼ tons tin conc.
Ipoh.—23¼ tons.
Jelapang.—25¼ tons tin conc.
Kampong Lanjut.—70¼ tons tin conc.
Kamunting.—186¼ tons tin conc.
Kinta Kellas.—26½ tons tin ore.
Kinta Tin.—34 tons tin ore.
Klang River.—5¾ tons tin conc. (dredge closed down on Dec. 3 for overhaul).
Kramat Tin.—27¼ tons tin conc.
Kuala Kampar.—122 tons tin conc.
Kuchai.—72 tons tin conc.
Larut.—91½ tons tin conc.
Lower Perak.—81¼ tons tin conc.
Malaysiam.—4 tons.

Pahang.—240 tons tin conc.
Rahman.—26 tons ore (heavy November rains retarded production).
Rantau.—81¼ tons tin conc.
Rawang Conc.—75¾ tons tin conc.
Rawang Tin.—105¼ tons tin conc.
Renong.—114 tons tin ore.
Southern Kinta.—373½ tons tin conc.
Sungei Kinta.—39 tons.
Taiping.—27½ tons tin conc.
Tambah.—7¼ tons tin conc.
Tanjong.—109 tons tin ore.
Tongkah Harbour.—31½ tons tin conc. (Bhuket dredge closed down one week for boiler overhaul.)

NIGERIA

Amalgamated Tin.—439 tons tin conc. and 17 tons columbite.
Bisichi.—82 tons tin and 18 tons columbite.
Ex-Lands.—85 tons tin conc.
Gold and Base Metals.—57 tons tin conc.
Jantar Nigeria.—20 tons tin and 14 tons columbite.
Jos Tin.—16¼ tons tin conc.
Kaduna Prospectors.—6½ tons tin ore.
Kaduna Syndicate.—23½ tons tin ore.
Keffi.—22 tons tin conc.
Naraguta Extended.—6¼ tons tin ore.
Naraguta Karama.—10½ tons tin ore.
Naraguta Tin.—26¼ tons tin ore and 5½ tons columbite.
Ribon Valley.—8 tons tin conc.
Rukuba.—1¼ tons tin ore.
South Bukeru.—3½ tons tin ore.
Tin Fields of Nigeria.—1¼ tons tin ore.
United Tin Areas.—8 tons tin conc.

MISCELLANEOUS

Bangrin.—82 tons tin ore.
Beralt Tin.—212 tons wolfram conc. and 12 tons tin conc.
Geevor.—60 tons black tin (65 per cent Sn.)
Kamra.—18½ tons tin conc.
Rooiberg Minerals.—Profit £29,262.
Siamese Tin.—159 tons.
South Crofty.—27¼ tons black tin.
Zaaiplaats Tin Mining.—Profit, before tax, £13,248.

Mr. C. W. Boise has been appointed chairman of Consolidated African Selection Trust and Sierra Leone Selection Trust in succession to Mr. A. Chester Beatty. **Mr. Chester Beatty, Jnr.,** has been appointed vice-chairman.

Sir Richard Snedden has been appointed a director of Gold Fields Rhodesian Development.

The Cornish Institute of Engineers will hold a general meeting in the lecture theatre of the Camborne School of Mines on Thursday, February 21, at 7.15 p.m., when an illustrated lecture entitled "A Review of Some Mineral Dressing Practices in the U.S.A." will be delivered by Mr. F. B. Michell.

The Institution of Mining and Metallurgy will hold a general meeting in the Apartments of the Geological Society, Burlington House, Piccadilly, London, W.1, on Thursday, February 21, at 5 p.m., when a paper entitled "The Dust Problem in the Kolar Gold Mines," by Mr. H. H. Watson, will be submitted for discussion.

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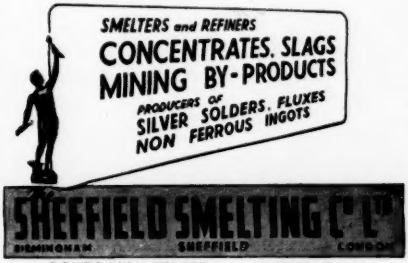

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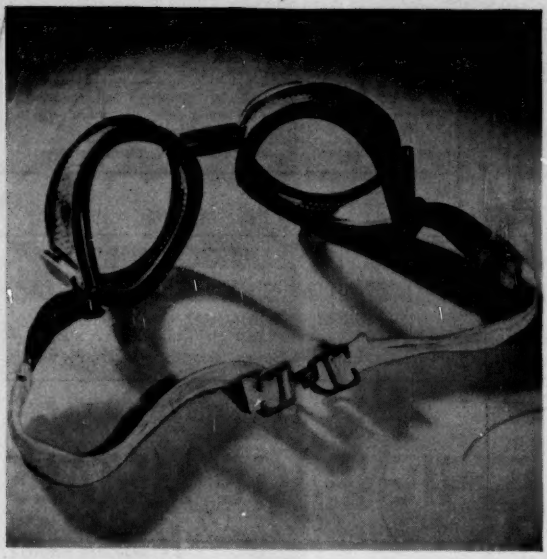

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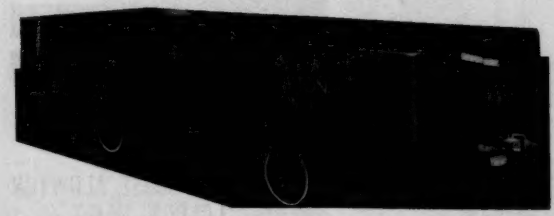

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